

HANGAR ONE
Moffett Field, California

Re-Use Guidelines
prepared for
NASA/Ames Research Center

prepared by
Page & Turnbull, Inc.
August 24, 2001

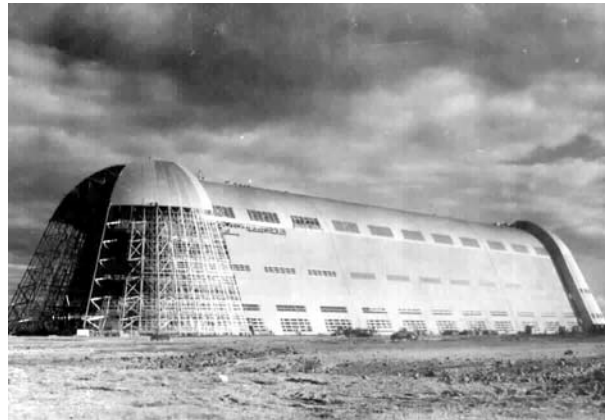


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Cover photo: Hangar One, c. 1921. Source: Moffett Field Historical Society.

INTRODUCTION

Project Team

The office of Daniel, Mann, Johnson & Mendenhall (DMJM) working with NASA Ames Research Center at Moffett Field, has requested Page & Turnbull to develop Re-Use Guidelines for Hangar One. Page & Turnbull's research has been conducted with the assistance of NASA project managers, facility managers, building officials, and the Fire Marshall office, as well as project managers from the Moffett Field office of DMJM.

Purpose

Re-Use Guidelines for several buildings within the designated historic district at Moffett Field have been completed by others. These guidelines establish parameters for rehabilitation work and building reuse. Page & Turnbull has been directed by DMJM to evaluate the historic fabric of Hangar One, respond to code deficiencies within the context of the historic building code, and develop Re-Use Guidelines for Hangar One in light of the historically significant nature of the structure and its context.

Methodology

The following Re-Use Guidelines are informed by several sources including historical information and plans supplied by DMJM, with Sheri Williams as project manager, site visits performed by Page & Turnbull in Spring of 2001, as well as visits to the Moffett Field Museum and San Francisco Public Library. Background information was obtained from a 1998 report citing code deficiencies at Hangar One by Dan Kaiser, of S.A.I.C., and Don Folsom, of Bechtel National, Inc., and a preliminary survey of Hangar One produced by DMJM in June of 2000. In addition, interviews were conducted with Don Folsom, Trish Morrissey from the NASA Building Department, Michael Makinen, Historic Preservation Officer with NASA, Will Fierro of the Fire Marshall's office, Carol Henderson of the Moffett Museum, and Dave Ferguson, the NASA facilities manager at Hangar One.

BUILDING SUMMARY

Description

Air ship hangars were first introduced by the British, French, German and Italians before WWI. Constructed occasionally on water but generally on land, these lightweight steel-framed structures were designed to house and maintain large air ships such as the zeppelins. In the United States, the large steel or wood trussed structures were generally very tall and long, but quite narrow producing an elongated arched shape. Most hangars had huge interiors (to accommodate the air ships), often with side aisles which housed research workshops and administrative offices. America's first air ship hangar was built in 1921 in Lakehurst, New Jersey.¹

In an effort to identify hangar types, the writers have applied terms found in a report by the United States Air Force, *Historical and Architectural Overview of Military Aircraft Hangars*. In this report, hangars are separated into principal material divisions based into their primary structural materials (steel, wood, or concrete). Because the large majority of military hangars are steel, this division is further divided into truss, girder, and long-span joint subdivisions. Hangar type is determined by the form of the structural cross section over the hangar bay (gable, gambrel, etc.). Hangar One at Moffett Field is framed of steel which was popular due in part to its strength-to-weight ratio. Steel can also be readily fabricated with individual members that can be assembled into trusses that span long distances, and these are easily transported.² Hangar One is a steel, truss, arched hangar type according to military terminology.

The former naval base at Sunnyvale contains many different building types, though the most outstanding is Hangar One, designed and built by the Navy Department, Bureau of Yards and Docks in 1932. Its construction preceded the other buildings located on



*Aerial view of Hangar One from the west, c. 1940.
Source: Moffett Field Historical Society.*

¹ Douglas Botting, *The Giant Airships-The Epic of Flight*. (Alexandria, VA: Time-Life Books, 1980).

² Website: <http://www.fas.org/man/dod-101/usaf/docs/webster>, accessed 4/10/01.

the base, which date from 1933. Hangar One is a true landmark: a colossal structure marking the land and skyline. The hangar is 1,133 feet long, 308 feet wide, and 198 feet high. By comparison, hangars housing commercial aircraft in the early 1930s were about thirty to fifty feet high and seldom had a footprint exceeding 200 feet in plan dimension.

The hangar exhibits many character defining features including its Streamline Moderne form, industrial exterior skin, ‘clam shell’ doors, strip windows, and exposed interior framework, as well as the original light fixtures and dirigible tie-downs. Architecturally, Hangar One mimics the form of the dirigibles it once



Aerial view of Hangar One c. 1940s. Source: Moffett Field Historical Society.

housed, while the Streamline Moderne rounded shape reflects the architectural style of the time period. In 1932, Streamline Moderne was a prevalent phase within the Art Deco movement. Streamline Moderne emphasized horizontal aspects of design and was characterized by curved end walls, rounded corners, and flush windows. The hangar is set on a rectangular shaped floor plan with the hangar doors forming



Streamline Moderne design was also applied to other forms, illustrated for example, in the Pennsylvania Streamline diesel. Source: www.geocities.com/sobo/2066/frames.html

the rounded shape. The exterior skin of the structure utilized an innovative, fire-resistant material for the time period, galbestos. Most of the exterior is composed of Galbestos, a corrugated sheet steel plate containing asbestos. Large hangar doors run the full height of both ends of the building. These ‘clam shell’ or ‘orange peel’ doors form a half-dome shape when closed and retract back when opened. The doors are run on wheels set in tracks; electric motors power the wheels. Four rows of window bands (which appear flush with the skin of the building) are located on both the eastern and western façade. The interior of the hangar reveals the method of construction; three hinged steel truss arches cross the space and bracing stabilizes the framing. The framework is interlaced with catwalks for access to the upper areas. Two elevators (only one still exists, albeit in an altered state) were installed

at the midpoint of the hangar for access to the upper areas. Two and three story offices and workshops line the east and west perimeter of the hangar. These workshops were integral to the operation and maintenance of the dirigibles and much of these rooms still exist. Other character-defining features still existing are the ‘explosion-proof’ light fixtures manufactured by Westinghouse, Style 1082, and the dirigible tie-downs encased in the original concrete floor.

History

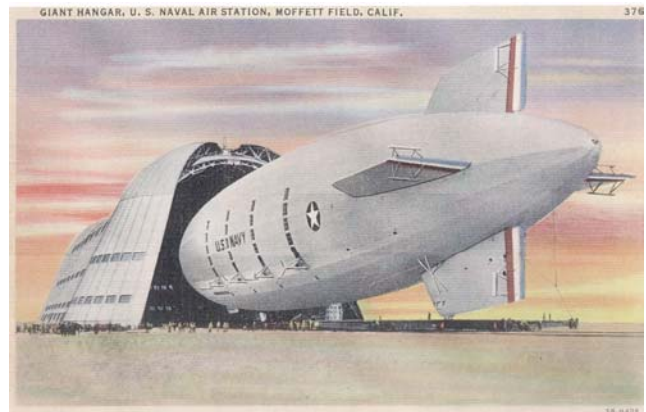
The Naval Air Station at Sunnyvale, California, which will be the home of the USS Macon, will be, on its completion, the most modern and completely equipped airship base in the world, and by its central location on the Pacific Coast and the favorable climatic conditions in the vicinity will permit the full utilization of the Macon as an effective arm of the United States Fleet.

- Newsletter, Bureau of Aeronautics, Navy Department-June 1933

The creation of Moffett Field and Hangar One is linked to the birth of a new period in American aviation, the Lighter-Than-Air (LTA) era, which began with an idea 70 years ago. Germany had found success in using giant airships for scouting purposes

during World War I, and the United States did not want to be

left behind.³ As the United States became concerned about the security of its lengthy coast lines, dirigibles became an essential component of the Navy Department. The Navy’s early use of the LTA craft may be traced back to the Civil War. Union forces used hydrogen filled balloons with attached baskets for aerial reconnaissance missions. Dirigibles were more effective than balloons, able to observe large areas of land and sea longer than any other aircraft at the time.



*Postcard showing the dirigible arriving at Hangar One, c. 1934.
Source: Stanley A. Piltz, San Francisco, California.*

³ Website: <http://history.acusd.edu/gen/Uspics/moffett/60thhtml>, accessed 4/10/01

In support of the dirigible program, a chain of airship mooring and docking stations was constructed across the country, one on the east coast (Lakehurst), one in the Midwest (Akron) and one on the west Coast (NAS Sunnyvale). Hangar One at Moffett Field was constructed for the Navy in order to house Lighter-Than-Air (LTA) craft. In the 1920-30s, dirigibles, along with sea planes and surface craft, would provide the best protection against submarines. Unfortunately, America's airships (*Shenandoah*, *Akron* and *Macon*) were plagued by disaster and all met violent ends. Their role as a viable form of defense was short-lived and was quickly succeeded by the 'propeller' and followed by the 'faster-than-sound' eras of aircraft.

In 1929, the Navy department authorized construction of two large dirigibles, (rigid airships) named USS *Akron* and USS *Macon*, that were to be the nucleus of the modern air force. The Navy began searching for a west coast base for these airships. Contributing to this search was Laura Thane Whipple, a local real estate agent who was selling a ranch in Sunnyvale at this time. She recalled an article indicating the need for a 'metropolitan area' dirigible base on the west coast. Mrs. Whipple alerted representatives of the Bay Area Chamber of Commerce and state politicians who began the campaign for a base. Competition was heated throughout the nation, particularly with the city of San Diego which offered Camp Kearny for \$1. Santa Clara, San Mateo, San Francisco, and Alameda counties collaborated to raise support and funds. They eventually raised \$470,000 to buy 1,000 acres of the Posolmi Rancho, believed to be the last intact land grant in California. In February of 1931, President Herbert Hoover signed a bill authorizing the acceptance of 1000 acres of land between Sunnyvale and Mountain View. The land was sold to the government for \$1, in order to match San Diego's deal. The new base would bring much needed jobs and income to Northern California.

The first building constructed at the base was Hangar One, which was to become the new home for the dirigible *Macon*, the largest aircraft in the world at the time. Although intended to house the USS *Macon*, the hangar's eight acres of clear floor space was designed ultimately to house airships of nearly



U.S. Navy dirigible, USS Macon, c 1933. Source: Moffett Field Historical Society.

twice the volume of USS *Macon*. The *Macon* completed its maiden voyage across the United States to Sunnyvale, arriving with much fanfare on October 15, 1933 after a 70-hour flight from Lakehurst, New Jersey. The *Macon* was housed and maintained in Hangar One. The eastern side of the hangar had large doorways which opened to accommodate entry of the small airplanes, the Sparrowhawks. The *Macon* carried four Sparrowhawk fighter planes in a hangar bay fitted within the dirigible and one additional Sparrowhawk on an eternal perch. The planes were designed for scouting, as well as for the protection of the ship. They were routinely launched and recovered in flight by an ingenious trapeze device that allowed the planes to be lowered into the sky and, later, raised into the belly of the *Macon*.

Tragically, eight days before the establishment of Naval Air Squadron (NAS) Sunnyvale, *Macon's* sister ship, *Akron*, crashed with the loss of all hands, including Admiral William A. Moffett. On May 17, 1933, the facility landing field was renamed Moffett Field in honor of the admiral. On February 12, 1935, the *Macon* shared the same fate as the *Akron*, crashing into the water off of Pt. Sur, California. Only two people were killed, but it marked the end for the new base and its huge hangar. Government officials began to doubt the worth of such vehicles and deemed them obsolete. In 1935, the facility was turned over to the Army for use as a primary training center.

From 1935 until 1942, the base remained under Army control. During this time, the base became the home for the 82nd Army Observation and the 9th Airbase Material squadrons. A few years later, the base changed over to the West Coast training center for the Army Air Corps, the predecessor to the U.S. Air Force. After December of 1941 and with the bombing of Pearl Harbor, the site reverted to a naval base. The Navy reestablished NAS Moffett Field on April 16, 1942. Although intended primarily as a LTA training base, NAS Moffett Field provided training to transport and patrol squadrons.



1935 Army Air Corps planes demonstrating the immense size of Hangar One. Source: Moffett Field Historical Society.

During the post war years the base became a major Naval Air Transport Service Squadron Center. Hangars Two and Three were

constructed in 1942 across the airfield and are now part of the historic district. The base moved into the jet age and extended Moffett Field's landing strips and modified its hangars. During the Korean Conflict in 1950, Moffett housed the first night jet fighter in the service. More support buildings and landing facilities were built during this time period. The base transferred use once more, shifting occupation by jet fighters to becoming the home of the Navy's first land-based anti-submarine patrol aircraft, the Orion Hunter. These planes would become a common sight at Moffett Field for the next 30 years. During the 1970s, the base became the headquarters of the Commander Patrol Wings, U.S. Pacific Fleet, responsible for patrolling 93 million square miles of ocean from Alaska to Hawaii. Operations continued until the Navy officially closed Moffett Field in July 1, 1994 and the base continued operations under control of NASA.

Construction

Once the land was purchased by the Navy, construction at Moffett Field commenced immediately. The first structure built was Hangar One completed in 1932 at a cost of \$2.25 million. Hangar One was taller than all the buildings in the South Bay except one, the Bank of America tower in San Jose. The size of Hangar One is slightly smaller than the hangar in Akron Ohio, although the design is almost identical.

Construction of Hangar One required about 8,200 tons of structural steel and about 8½ acres of concrete floor.⁴ The roof is constructed of wood planking sheathed with Galbestos, a corrugated sheet steel plate containing asbestos, which also covers most of the exterior of the hangar.



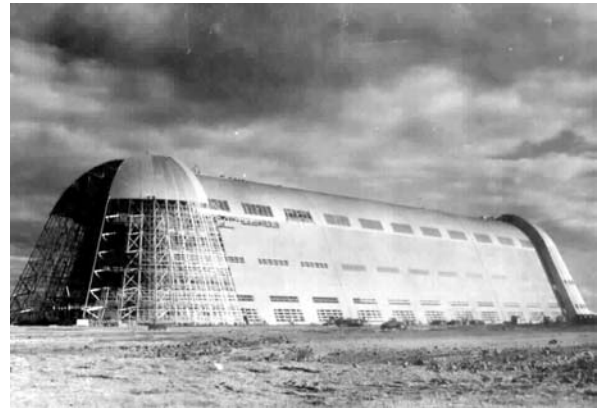
The hangar was constructed using an innovative building tool; a huge timber traveler mounted on eight 50-ton

Ariel view during construction of Hangar One. Construction was accelerated with the use of the traveler, seen near the center of the photo. Source: Moffett Field Historical Society.

⁴ Navy Department Newsletter, *United States Naval Air Station at Sunnyvale, C.A. No. 305* (Bureau of Aeronautics, 1933).

railroad flatcars running on three parallel railroad tracks. Weighing 500 tons, standing 194 feet high and mounting three stiff-leg derricks, the traveler enabled the installation of a complete 72-foot-long bay assembly, consisting of an arched truss, bracing, roof members and catwalks, totaling some 350 tons of steel, in as little as three and one-half days.⁵ This traveler was set perpendicular to the walls of the hangar and moved north to south allowing more efficient construction of the hangar framework. The building is divided into three separate sections of truss and framework, with expansion joints running through the entire arched profile. The truss and sheathing is supported at ground level on a 2-½ foot wide concrete wall in turn is supported by continuous concrete footings. Tunnels used for steam pipes, helium deflation pipes and other service systems were installed in the concrete foundation.

The ‘clam-shell’ doors have two independent leaves weighing about 500 tons each, which run on a curved track. Each leaf moves at approximately twelve feet per minute and takes about 12 minutes to fully open. One leaf is operated at a time by a 250 horse power rack and pinion motor.⁶



Hangar One in 1932, close to completion. Source: Moffett Field Historical Society.

Two standard gauge railroad tracks, spaced 80 feet apart, were installed through the hangar and extended beyond it at both ends for nearly a half mile, terminating at the two mooring circles. Outside the hangar, a massive 9-story mooring mast was installed which allowed the dirigibles to be secured by the nose of the ship and led



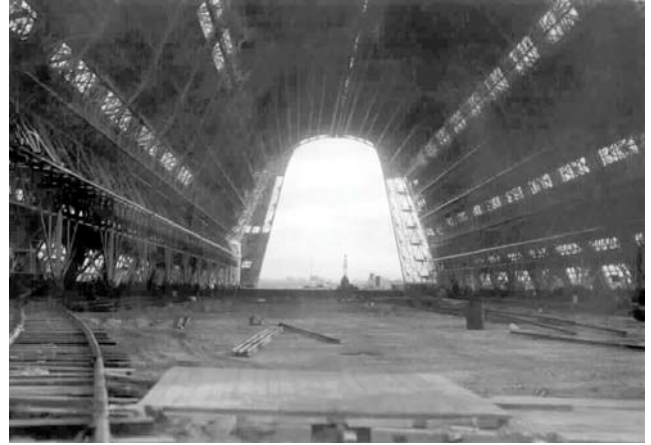
Macon being led into the hangar on railroad tracks by the mooring mast, c. 1930s. Source: Moffett Field Historical Society.

⁵ History & Heritage Committee-San Francisco Section of American Society of Civil Engineers, *Historic Civil Engineering Landmarks* (San Francisco, CA: Pacific Gas & Electric, 1977).

⁶ Navy Department Newsletter, *United States Naval Air Station at Sunnyvale, C.A. No. 305* (Bureau of Aeronautics, 1933)

into the hangar. The mooring mast moved along the railroad tracks and facilitated the transport of the ship into the hangar.

The interior of the hangar was designed to house workshops, storage spaces, and special auxiliary apparatuses such as an air-conditioned storage vault for spare gas cells. Today this storage vault is referred to as the Cork Room, the walls being encased in roughly six inches of cork with oak flooring. Upon completion of the hangar structure in 1932, extensive service systems such as electrical lighting and power systems were installed.



Interior of Hangar One, close to completion. Source: Moffett Field Historical Society.

The engineers in charge of the project were:

Rear Admiral A.L. Parsons, Chief of the Bureau of Docks and Yards, designer
Lieutenant Commander E.L. Marshall, officer-in-charge of construction.
Ernest L. Wolf assisted as associated civil engineer.

Contractors were:

Raymond Concrete Company (General Site Grading, Railroad Track and Hangar Foundations)
Wallace Bridge and Structural Steel Company (Hangar Super Structure)
Siems Helmers, Inc. (Hangar Coverings)
E.C. Nichols (Hangar Lights and Power System)
Otis Elevator Company (Elevator)

As Hangar One has been occupied by many different military units, the rooms have been frequently altered for different uses. It has been difficult, therefore, to determine the original layout of rooms in the hangar. According to a 1932 heating plan executed by the U.S. Navy, Bureau of Yards and Docks, the original rooms are as follows:

*First Floor**East*

Operations Office
Rigid Air Ship Riggers
Ground Gear

West

Joiner Shop
Plating
Machine Shop
Fabric Shop
Inspection & Testing Lab
Instrument Shop
Office Space
Structural Wire and Netting Shop
Metal Shop
Aircraft Engine Over-Haul Shop

There were six sliding doors on each side which provided access to different double story workshops on the first floor. Some of these sliding doors remain today. In 1932, two elevators were installed to carry one or two persons to the top of the hangar. Moving on tracks placed against the truss, the elevator car maintained a vertical position, adapting to the curve of the hangar along the way. Installed at the very top of the hangar, in the center, were crane cabs which allowed workers to descend down near the top of the dirigible and work on the exterior. Currently, many additional single story rooms are present which have been added in the center of the hangar, probably dating from the 1970's.

Second Floor

An original office space on the southwest end of the hangar remains. During WWII, many second story rooms were added on the west side of the structure. Today, half of these rooms have been removed, but some remain on the northern portion of the west side. The east side of the hangar seems to have undergone more additions and changes to its first, second

and third stories. Many second story offices were added, also during WWII. In late 1930s or early 1940s, the hollow clay tile walls were constructed to house offices.

Third Floor

The third story contains the 'Cork Room', which was constructed in the 1930s along the east side of the hangar. The specialized room was used for maintenance and repair of the dirigible gas cells. The air conditioned room is insulated with six inches of cork and has a track mounted the length of the ceiling with hooks to hang the cells, for drying purposes. This is the most important surviving room in the hangar with physical evidence of the past 'Lighter -Than-Air' age. Constructed at the top of the third floor framework were wooden cantilevered cradles which were used to hold mechanical parts for the dirigible during maintenance.

NATIONAL REGISTER

National Register of Historic Places, Historic District

In February of 1994, the United States Naval Air Station, Sunnyvale was nominated a Historic District by the National Park Service (National Register of Historic Places). Hangar One has been determined eligible for nomination to the National Register of Historic Places by the US Navy, in consultation with the California State Historic Preservation Officer. Other designations include induction as a Naval Historical Landmark, a California Historic Civil Engineering Landmark by the San Francisco Section, American Society of Civil Engineers.⁷

As Hangar One is part of the a historic district as determined by the National Register of Historic Places, specific standards should be followed when rehabilitating or altering the structure. Any alterations to the significant character-defining features should be approached carefully and sensitively, following the Secretary of the Interior's *Standards for Rehabilitation*. The Secretary of the Interior's *Standards for Rehabilitation* are as follows:

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alterations of features, spaces, and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive features, the new feature will match

⁷ Bonnie Bamburg, National Register of Historic Places Nomination for United States Naval Air Station Sunnyvale, CA-Historic District. (San Jose: Urban Programmers, [1991]) p.2.

the old in design, color, texture, and where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.

7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Significance

Although Hangar One is presently included as part of the U.S. Naval Air Station at Moffett field - Central Historic District, the hangar is also individually eligible for listing on the *National Register of Historic Places*. As a contributing building to a Historic District, the Hangar is entitled to the same benefits and protection as an individually listed property on the *National Register*, namely:

1. Recognition that the property is of significance to the Nation, State and Community
2. Property is eligible to use the State Historic Building Code
3. Federal or federally assisted projects are subject to Section 106 Review (Section 106 of the National Historic Preservation Act of 1966 requires that Federal agencies allow the Advisory Council on Historic Preservation an opportunity to comment on all projects affecting historic properties either listed in or determined eligible for listing in the *National Register*.)
4. Property is eligible for Federal Tax Credits
5. Property is qualified for Federal grants for historic preservation, when funds are available

Should the Hangar become listed individually on the *National Register*, or be recognized as a *National Historic Landmark* (nationally significant historic places that possess exceptional value or quality in illustrating the heritage of the United States), greater prestige would be

placed on the historic importance of the building. The unique historic features would be highlighted and set apart from the context of the Central Historic District. The protection afforded the building, however, would remain as it is with the current designation within the Historic District.

According to the *National Register* historic resources must be significant at the local, state, or national level under one or more of the following criteria:

- A. Criterion A (Event): Buildings that are associated with events that have made a significant contribution to the broad patterns of our history;
- B. Criterion B (Person): Buildings that are associated with the lives of persons significant in our past;
- C. Criterion C (Design/Construction): Buildings that embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master; and
- D. Criterion D (Information Potential): Buildings that have yielded, or may be likely to yield, information important in prehistory or history.

The National Register criteria under which this site would be eligible are Criterion A [Patterns of Events - Military] and, Criterion C [Design/Construction]. In regard to Criterion A, a case can be made that Hangar One has made a significant contribution to naval history. Hangar One housed the Macon, one of three Navy dirigibles (others were located on the East Coast and Midwest) in the United States. These dirigibles were a viable form of defense in the early 1900s before the 'propeller' military era. In regard to Criterion C, Hangar One meets this criterion as it embodies the distinctive characteristics of a type and method of construction. Hangar One is a distinctive 20th century building type, designed to hold the dirigible. This new mode of transportation and modern form of defense in the 1920-30s necessitated a new building type, the dirigible hangar, with a very wide, tall clear span space. Various hangars had been built previously to house airplanes, but air ship hangars to house dirigibles were a new phenomena in the 1920-30s. Therefore, Hangar One can be considered a new building type during the early 1900s. The Streamline Moderne form, the 'clam-shell' doors and exterior galbestos skin are distinctive characteristics of a 1930s hangar type. The method of construction utilized for Hangar One is significant for its contribution to engineering, employing the use of a traveler in its construction. Also applicable in regards to the method of construction is the size of Hangar One, its enormous

dimensions contribute to the significance of the structure. At the time of its construction, it contained the largest clear span for an enclosed structure in the United States.

Hangar One has been distinguished as a Civil Engineering Landmark according to the documents, “Historic Civil Engineering Landmarks of San Francisco and Northern California,” by the San Francisco Section of the American Society of Civil Engineers (ASCE). ASCE has determined the hangar significant for a number of reasons, including the sheer size of the structure and the construction technique. The use of a timber traveler in the construction process, has also been deemed significant especially as a distinct departure from prior methods of air dock construction.

Period of Significance

The period of significance is determined by a link to an important event or person, design or construction features, or information potential that deem the property important. The period of significance for Hangar One at Moffett Field are the years from its construction in 1932 to the end of WWII in 1945. This time period characterizes the initial construction and use by the Navy, and ends with the use as an army base during WWII in 1945.

BUILDING EXTERIOR AND SITE

Significant Zones

The hangar's immense size and unique shape make an impression on the skyline perceivable from any corner of Moffett Field and indeed for miles along the adjoining Highway 101.

This exterior shape is widely identifiable and has become symbolic of Moffett Field.

The curvilinear profile may be described by the upper roof portion, the side paneled section, and the lower paneled portion. The roof portion is black in color, whereas the side and lower galbestos corrugated panels are painted grey in color. Regularly spaced steel framed strip window bands line the side and lower portion of the elevation depicting the bay width of the interior truss sections. The glazing type varies at the strip windows, with rippled wire glass appearing in the lower bands and a corrugated textured wire glass occurring in the upper level bands. These portions of the exterior have been altered slightly over the building's history, mostly at the lower first and second floor levels where access and ventilation was required.

The North and South end hangar doors appear to be in original condition with perhaps only minor alterations at the closure strip between the 'clam shell' doors.

The vicinity around the Hangar is mostly paved and consists of parking, an access road, and an airstrip to the east of the hangar. To the south and east of the hangar within the exterior concrete paving are zones of metal tie-down rings embedded in roughly a 10 foot x 10 foot grid pattern. These do not exist to the north and west sides of the hangar where new street paving has been installed. A drainage grate original to the building surrounds the entire hangar and remains intact. Air-control towers and warehouses that once served Hangar One, remain on the east side, about 50 feet from the hangar. Miscellaneous utility warehouses, sheds, and electrical equipment crowd the west side of the building. These have been placed randomly with little regard to the exterior aesthetics of the site. Very little landscaping exists near the hangar. The only relief from the concrete paving is a 10 foot strip of lawn along the east side between the hangar and the road.

Significant Features and Elements

The significant exterior features include:

- Streamline Moderne form
- North and South end hangar doors
- Galbestos corrugated panels

Metal strip windows

Metal and glass tilt doors (now propped permanently in the open position)

Metal drainage grate

Metal tie-down rings

Air-control towers

BUILDING INTERIOR

Assessment of Interior Significance

The interior of Hangar One remains today a voluminous and structurally impressive space. The framework is nearly entirely exposed to the main interior space. The lower two to three story base, approximately 40 feet wide, is the only obscured portion of the structure filled in by original and new building volumes. Although historically the hangar has kept the high bay zone clear for aircraft, recent construction (post 1950's) has departed from this by occupying the middle area with modular one story classroom and office structures. These buildings located at the northern half of the building have blocked access and views to the north end of the building and hampered the overall perception of space in the hangar. Nearly all of the interior building areas have been altered over the years and, with the exception of the Moffett Museum at the west side, are no longer in use. The condition of these spaces varies from fair to poor condition.

There are a few remaining interior spaces and pieces of construction that do remain from the period of significance which are of merit. Those include, but are not necessarily limited to, the following:

- 'Cork Room'

- Wooden cantilevered cradles over 'Cork Room'

- Operations Office and other office space on the east and west sides of the hangar

- Selective stairs leading to office spaces and observation areas

- Transformer Rooms

- Toilets # 1 and # 6

- Metal walls and sliding doors enclosing original shop areas

- Elevator cab and structure (east side cab missing)

- Crane cabs along top portion of truss

- Mechanics breakroom at top of structure

- Explosion proof light fixtures, original hangar light fixtures and light switch boxes

- Drainage grate

- Dirigible tie-downs and tracks embedded in concrete floor

The entirety of the truss structure, framework, catwalks, metal decks, concrete base walls, and foundation is original. A steam tunnel running in the east/west direction of the hangar,

between Column Lines Seven and Eight, is also original to the building. The tunnel connects Hangar One to the boiler room in Building Ten.

A **Survey of Important Features** and **Historical Significance Diagrams** for the building are included in Appendices B, C, and D.

SAFETY/STABILITY

Foreword

Hangar One is a Type V, Non-Rated Building constructed in 1932. The hangar was built with the express purpose of housing and maintaining the dirigible, USS *Macon*, hence its large size. It is 385,290 S.F. in total area (209,035 S.F. in the high bay area). The hangar is 198' in height and 308' in width. The hangar was used only two years to house the USS *Macon*, due to the premature demise of the *Macon* in 1935. Its use as a hangar, however, continued through September 1997, housing various other airships, jets and air fleets.

In 1994, when the Naval operations at Moffett Field ceased, NASA took control over the operations and the Naval Air Reserve Santa Clara was established and moved into Hangar One. When the Naval Air Reserve moved out in 1997, Hangar One's use as a hangar was discontinued and other uses for the structure were considered. Currently, the Moffett Field Historical Society is located at the west perimeter of the hangar. The section of the building north of Column Line 7 is closed to the public due to hazardous materials exposure. The perimeter of the building has abandoned office space in the state of disrepair. Access to all rooms is strictly controlled, with the exception of 7 rooms occupied by the Moffett Field Historical Society on the west side of the hangar, and 2 rooms on the east side used for special event production.

Outside groups have expressed interest in renting the hangar for short-term events such as large dinners and temporary exhibitions. Recent events have ranged in size from 900 to as high as 7,800 in attendance. In addition, the California Air and Space Center is interested in making Hangar One its permanent home, thus transforming Hangar One into a mix-use occupancy containing public assembly, retail and restaurant, and exhibition space.

It is the change in use that has sparked concern in the hangar's code deficiencies with regard to Life Safety Issues. Two reports detailing code deficiencies have been produced as a result of this concern. One was produced by Dan Kaiser, of S.A.I.C., and Don Folsom, of Bechtel National, Inc., on June 28, 1999. The basis for this code analysis was the 1994 UBC, which has since been replaced by the 1998 UBC. The other was a preliminary survey produced by DMJM in June of 2000. Near the top of these concerns is Hangar One's lack of adequate and sufficient access and egress paths. Another concern revolves around the immense size of the hangar. The large size of the hangar, both in height and square footage, far exceeds

the maximum allowed in the 1998 California Building Code, thus exceeding code limitations regarding the maximum travel distance to an exit. Other code deficiencies include construction type, accessibility and various safety hazards.

Hangar One, often referred to as the “crown jewel” of Moffett Field, is held in high regard by NASA. Its historic significance is respected and there is a strong desire to make necessary repairs to the building in order to halt the current deterioration of the building. It is NASA’s desire not only to bring life back to the hangar through its re-use, but to do so without endangering the historically significant fabric of the building.

With this in mind, NASA, through DMJM, has requested Page & Turnbull evaluate the code deficiencies of Hangar One within the context of the State Historic Building Code. The following Code Issues Matrix presents a list of issues, with regard to building use, that are in conflict with the 1998 California Building Code. These issues are addressed in terms of short-term and long-term use of the building. Included in the matrix, are “Proposed Modifications” that have been discussed in the reports referenced above as well as in meetings Page & Turnbull has had with DMJM and NASA building officials. Comments and recommendations of the two reports are also included as part of the matrix. Each issue contains a response by Page & Turnbull with respect to the historical significance of Hangar One as well as the State Historic Building Code.

Finally, it is important to note that the 1998 California Building Code is intended for new construction. The code should be used as a guideline to develop an equivalent level of safety for Hangar One, as prescribed by the code, while preserving its historical integrity. When strict adherence to the code leads to destroying the historic fabric of the hangar, alternative solutions should be employed as long as the level of safety is not compromised.

CODE ISSUES MATRIX

Issue	Existing Conditions	Proposed Modifications	Previous Recommendations	Page & Turnbull Response	State Historic Building Code
Building Construction Type	<ul style="list-style-type: none">Type V, Non-Rated Building.Several of the Post-WWII office areas are sprinklered.	<p><u>Short-term:</u></p> <ul style="list-style-type: none">None <p><u>Long-term:</u></p> <ul style="list-style-type: none">Make modifications as required by Building Officials.	<p><u>Kaiser & Folsom Report:</u></p> <ul style="list-style-type: none">Removal of all wood frame structures within the hangar.Applied fireproofing material per Table 6-A to elevation of 25’ above the highest roof deck.Reconstruct offices and classrooms as Type 1 Fire-Rated construction. <p><u>DMJM:</u></p> <ul style="list-style-type: none">Identify alternative methods of achieving code-compliance for fire-resistive construction through substitution of traditional fireproofing with non-traditional coatings or alternate configurations of sprinkler systems.All new construction will meet the requirements of the Uniform Building Code.	<ul style="list-style-type: none">Hangar One to remain Type V, Non-Rated Construction.Removal of altered office space and Post-WWII construction.Preservation of selected rooms and wall assemblies with historical merit.Provide all new construction with Type I, Fire-Rated construction.Enable new construction to be reversible without impact to historic fabric.	<p>8-803 Continued use of existing nonstructural historic materials not meeting regular code requirements allowed, provided that public health and life-safety hazards are mitigated, as approved by the enforcing agency.</p> <p>8-402 Fire resistance requirement for existing exterior walls and existing opening protection may be satisfied when an automatic fire-extinguishing system designed for exposure protection is installed.</p> <p>8-403 Existing nonconforming materials used in interior wall and finishes may be surfaced with an approved fire retardant to increase the rating of the natural finish to within reasonable proximity of the required rating. <i>Exception: When an approved automatic sprinkler system is provided throughout the building, existing finishes need not be fire retardant.</i></p> <p>8-408 Wooden roof materials allowed where fire resistance is required if treated with fire-retardant treatments to achieve an equivalence to a Class C fire-resistive rating, or as otherwise permitted on a case-by-case basis.</p> <p>8-409 Every historical building which cannot be made to conform to the construction requirements specified in the regular code for the occupancy or use, and which constitutes a distinct fire hazard shall be deemed to be in compliance if provided with an approved automatic fire-extinguishing system.</p>
Structure	<ul style="list-style-type: none">Construction is steel, wood, concrete and transite with a metal roof covering on the main hangar. <p>Seismic evaluation by Rutherford & Chekene, December 1984:</p> <ul style="list-style-type: none">Almost all of the members were determined to be adequate, stress was below the allowable limit assumed at the time.Two places need reinforcing: the top of the arches and the connection at the lower pin where the arch connects to the “A” frame.	<p><u>Short-term:</u></p> <ul style="list-style-type: none">None <p><u>Long-term:</u></p> <ul style="list-style-type: none">Dependent on updated Structural Survey.	<p><u>DMJM:</u></p> <ul style="list-style-type: none">Upgrade of the 1984 Seismic Report based on prevailing code.New report to consider wind factor due to building height and site conditions.New interior construction should be self-supporting and seismically compliant to current code.Make the existing Hangar One structure seismically safe by strengthening and adding lateral bracing of the structure.	<ul style="list-style-type: none">Recommend that the structural strength of the building be thoroughly evaluated by structural engineer with expertise in historic structures.Structural upgrades limited to correct unsafe conditions and should be sensitive to the original structure.New Non-historical additions and alterations to comply with current code. These shall be structurally independent and reversible from the original structure.	<p>8-102 Work to remedy the building shall be limited to the correction of the unsafe (life-threatening) conditions, and it shall not be required to bring the entire building in compliance with regular code.</p> <p>8-703 Every structure or portion of a structure to be evaluated for structural capacity under this code shall be surveyed for structural conditions by an architect or engineer knowledgeable in historical structures. The survey shall document deterioration or signs of distress.</p> <p>8-705 Where no distress is evident, and a complete load path is present, the structure</p>

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Structure (con't.)					<p>may be assumed adequate by having withstood the test of time if anticipated dead and live loads will not exceed those historically present. Any unsafe conditions in the lateral-load-resisting system shall be corrected, or alternative resistance shall be provided.</p> <p>8-706 The forces used to evaluate the structure for resistance to wind and seismic loads need not exceed 0.75 times the seismic forces prescribed in the 1995 edition of the CBC. Reasonably equivalent standards may be used on a case-by-case basis when approved by the authority having jurisdiction.</p>
Electrical, Plumbing, Mechanical	<p><u>Mechanical:</u></p> <ul style="list-style-type: none">There are no fire dampers installed in the ductwork . <p><u>Electrical:</u></p> <ul style="list-style-type: none">According to the DMJM Preliminary Survey, the Electrical System is marginally under-rated for load assumptions. A more in-depth electrical survey is needed.Unsafe, open wiring in some areas, thus creating unsafe conditions. <p><u>Plumbing:</u></p> <ul style="list-style-type: none">The building has insufficient sanitary facilities.	<p><u>Mechanical:</u></p> <ul style="list-style-type: none">New HVAC planned. <p><u>Electrical:</u></p> <p>DMJM Preliminary Survey (p. 14):</p> <ul style="list-style-type: none">No electrical conditions that would prevent the re-use of Hangar one as a public building.It is assumed that up-grades will be required.Existing electrical will be able to handle upcoming needs with minimal upgrades. <p><u>Plumbing:</u></p> <p><u>Short-term:</u></p> <ul style="list-style-type: none">Needs met through portable facilities.	<p><u>Mechanical:</u></p> <p><u>DMJM:</u></p> <ul style="list-style-type: none">All new penetrations through hangar skin to be carefully planned and approved by NASA and the California State Historical Preservation Office (SHPO). <p><u>Electrical:</u></p> <p>Kaiser & Folsom: Grounding needs to be upgraded.</p> <p><u>Plumbing:</u></p> <p>Kaiser & Folsom: Provide minimum facilities for each occupancy, as required by Appendix C 94 UPC and Chapter 29 UBC</p>	<p>Survey existing systems to identify any safety deficiencies that could lead to a fire. The mechanical, electrical and plumbing systems which do not contribute to the historic character should be removed if they create a life/safety hazard.</p> <ul style="list-style-type: none">Design new exposed equipment and feeds to integrate with the building’s industrial vocabulary. New equipment should be understood as new construction.New penetrations through hangar skin to be carefully planned and approved by NASA and SHPO.Investigate use of tunnel for possible placement of mechanical, plumbing equipment.Add sufficient plumbing fixtures to bring Hangar into compliance employing space planning that is sensitive to the historic plan of the hangar.Historic explosion-proof light fixtures attached the main structure to remain.Explosion-proof light fixtures in the Cork Room to remain.Preserve, if feasible, original light fixtures hung from hangar structure.Historic electrical outlet receptacles to remain.Preserve historic restrooms, see Diagram A.	<p>8-901 Historic buildings are exempted from compliance with energy conservation standards. New appliances or equipment will be code compliant.</p> <p>8-902 Ventilation systems shall be installed so that no safety hazard is created.</p> <p>8-902, 8-903, 8-904: For Mechanical, Plumbing and Electrical, the SHBC states, “Existing systems which do not, in the opinion of the enforcing agency, constitute a safety hazard may remain in use. The enforcing agency may approve any alternative to these regulations which achieves reasonably equivalent life safety.”</p> <p>8-903 New, non-historic materials shall be code compliant. The enforcing agency shall accept alternative materials which do not create a safety hazard where their use is necessary to maintain the historical integrity of the building.</p> <p>8-904 Where an equipment grounding conductor does not exist and, in the opinion of the enforcing agency, it is impracticable to connect an equipment grounding conductor to the grounding electrode system, receptacle convenience outlets may remain the non-grounding type. Receptacle outlet spacing and other related distance requirements shall be waived or modified if determined to be impracticable by the enforcing agency.</p>
Fire/Life Safety					
Allowable Height	Maximum allowable height is 40’, Hangar One is 194' in height. Maximum allowable stories for Hangar is 1, for the Office areas, it is two.	The existing building will remain 194’ high, exceeding the maximum allowed per UBC Table 6-A.	Kaiser & Folsom: There are no exceptions that may be used to increase the allowed height of the building, a waiver would be required for this item.	<ul style="list-style-type: none">Reference SHBC 8-302.5 to obtain height waiver.Exceptional height of Hangar One is an integral part of the historic character of the building.	8-302.5 The maximum height and number of stories of a historical building shall not be limited because of construction type, provided such height or number of

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					stories does not exceed that of its designated historical design.
Access & Egress	<ul style="list-style-type: none">Maximum travel distance for unsprinklered building is 200 ft.Maximum travel distance for a sprinklered building is 250 ft.Office space on second and third floors do not have compliant access and egress. These offices have been closed and access to them is restricted. <p><u>North Half of Hangar:</u></p> <ul style="list-style-type: none">Closed to the public.Overall shortage of complying exits.Poor access to exits, especially from office areas.Poor signage.No emergency lighting. <p><u>South Half of Hangar (Event Area):</u></p> <ul style="list-style-type: none">Five ground exits available.Emergency light in all exit corridors.Visibility of access to exits from within event area is not optimal	<p><u>Short-term:</u></p> <ul style="list-style-type: none">Modifications will involve primarily the south half of hangar.Employ existing exiting system for short-term events as approved by Fire Marshall.No proposed upgrades in the short term.New exit will be constructed on west side of hangar, between column lines 11 and 12.The exit at the museum entrance will be upgraded from 3 feet in width to 4 feet in width. <p><u>Long-term:</u></p> <ul style="list-style-type: none">Modifications will involve entire hangar.The overall shortage of complying exits with all proposed occupancies will be addressed.Long-term upgrades based on reuse recommendations.Sprinkle building.	<p>Kaiser & Folsom:</p> <p>Do not recommend increasing travel distance due to the proposed new education, assembly and business occupancies.</p> <p>Each Occupancy type to have its own requirements for number of exits and location of exits.</p> <p>A detection, alarm and voice notification system shall be required as per NFPA 101 Section 9-3.4.</p> <p>Since Hangar 1 will be considered as an A-1 Occupancy, the hangar is required to have a main exit capable of exiting a minimum of 50% of the total occupant load. It is suggested that the main exit be located on the east side of the building that is typically used as the main entrance. It is also suggested that the large overhead door that is directly south of the entrance be reopened to provide this exit width.</p>	<ul style="list-style-type: none">Short-term use: continue to use the Hangar Doors as emergency exit as required and continue to use new code-complying exits.Work with NASA Bldg. enforcing agency to formulate access and egress strategy to meet intended life & safety standards.Use existing exits when possible to avoid additional alterations to the building.Explore “co-equal” entrances in order to evenly distribute the width of the total exit path around the perimeter of the building.Short-term use: continue to use the overhead doors on the east side as the main entrance to the hangar.Long-term use: main entrances should be designed keeping the site master plan design in mind.Add new exits to serve areas of high occupancy and upper floors as required.Design a very clear and efficient system of egress to not only compensate for the size but also bring the level of safety up to the equivalency of a completely code conforming building.Egress design to be enhanced via state of the art signage, alarm system and annunciation systems.Location and design of new exits defer to the building aesthetic.Place new exits where the metal framed windows are located. New penetrations should be reviewed by building officials, using guidelines set by the State Historic Building Code and this report. See “Common Considerations”, Example 1.All new construction to meet code standards for safe egress.Replace non-historic doors that are non-complying with code-complying doors.	<p>8-410.2 An automatic fire-extinguishing system shall not be used to substitute for or act as an alternative to the required number of exits from any facility.</p> <p>8-501.1 These regulations require enforcing agencies to accept reasonably equivalent alternatives to the means of egress requirements in the regular code.</p> <p>8-502.1 Exits shall conform or be made to conform to the provisions of the regular code.</p> <p>Exceptions:</p> <ul style="list-style-type: none">New fire escapes and fire escape ladders which comply with Section 8-502.2 shall be acceptable as one of the required means of egress.The enforcing agency shall grant reasonable exceptions to specific provisions covered under applicable regulations where such exceptions will not adversely affect the life safety intended.In lieu of total conformance with existing exiting requirements, the enforcing agency may accept any other condition which will allow or provide for the ability to quickly and safely evacuate any portion of a building without undue exposure and which will meet the intended exiting and life safety stipulated by these regulations.Existing previously approved fire escapes and fire escape ladders shall be acceptable as one of the required means of egress provided they extend to the ground and are easily negotiated, properly signed and in good working order.
Maximum Allowable Area	<ul style="list-style-type: none">Maximum allowable for Type V-N “Hangar” is 5,100 S.F., 1994 UBC.For B occupancy, the maximum allowable is 8,000 S.F., 1994 UBCWith its current classification of B-2 and B-3, Hangar One exceeds all maximum allowable area even with	<p><u>Possible Occupancies:</u></p> <p>A-1, A-2, A-2.1, A-3, & B-2, E-1 & E-2. Building Officials are recommending A-1 because it is the most stringent.</p> <p><u>For a type A-2.1 Occupancy:</u></p> <ul style="list-style-type: none">"A" occupancy not permitted for Type	<p><u>Kaiser & Folsom:</u></p> <p>Recommendation that the building not be allowed to be used as A-2.1 (1994 UBC) or B-2 (1967 UBC) Occupancy without major modifications. These include:</p> <ul style="list-style-type: none">Remove wood frame structures from inside hangar	<p><u>Long-term:</u></p> <ul style="list-style-type: none">Sprinkler the building to eliminate allowable area limitations.The Post WWII offices within the open area are not historical and should be demolished.The sprinkler system planned for long-term use is phased to take care of short-term needs and	<p>8-302.2 The use or character of the occupancy of a historical building may be changed from its historic use or character provided the building conforms to the requirements applicable to the new use or character of occupancy as set forth in this code. Such change in occupancy</p>

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	allowed increases.	<p>V, Non-rated construction.</p> <ul style="list-style-type: none">Construction type for "A" must be Type 1 or Type 2 Fire Resistive.For unlimited area, hangar must be Type 1 Fire Resistive construction. <p><u>For B Occupancy:</u> Maximum area limitation: 8,000 sq. ft. Even with allowable increases (the total allowable can be brought up to 64,000 S.F.), Hangar One is still not in compliance.</p> <p><u>For E-1 or E-2 Occupancy:</u> Table 5-B: Maximum Area of 9,100 S.F. With allowable increases, the total for E occupancy is 36,400 S.F.</p> <p><u>Mixed Occupancies:</u> UBC Section 504.3 When a building houses more than one occupancy, the area of the building shall be such that the sum of the ratios of the actual area for each separate occupancy divided by the total allowable area for each separate occupancy shall not exceed 1.</p>	<ul style="list-style-type: none">Provide automatic sprinkler system throughout the building.Apply fireproofing material to provide min. fire ratings per table 6-A to an elevation of 25' above the highest roof deck, and construct offices and class rooms as per requirements for Type 1 fire rated construction. This will allow for unlimited area in all of the proposed occupancies.Fire sprinkler installation would be expected throughout the hangar, not just in the habitable areas. Consideration will need to be given to any exhibits that may obstruct the flow pattern of the sprinklers. <p><u>DMJM:</u> With the possible occupancies of A-1, A-2, A-2.1, A-3, & B-2, DMJM gave Hangar One a Type I designation since Type I has no maximum allowable area. With this designation, extensive fire-proofing has to be done. “Fireproofing may include spray-on cementitious coatings, gypsum board or plaster enclosure of the structural elements.”</p> <p><u>CBC, Section 505.3</u> Allowable area of the hangar can be unlimited provided an automatic sprinkler system is installed throughout the building and the building is entirely surrounded by yards adjoining public ways not less than 60’ in width. (Not all sides are surrounded by yards 60’ in width.)</p>	<p>use. Sprinkler system located to protect the habitable spaces (consult with Fire Protection Specialist for design).</p> <ul style="list-style-type: none">Design the sprinkler system to integrate with the aesthetics of the hangar.Need to identify alternative methods of achieving code-compliance for fire-resistive construction through substitution of traditional fire-proofing with non-traditional coatings (e.g. intumescsent coatings) or alternate configurations of sprinkler systems (e.g. deluge-systems).The structure should not receive invasive fireproofing since this would negatively impact its historic value.	<p>shall not mandate conformance with new construction requirements as set forth in prevailing regular code, provided the new use or occupancy does not create a fire hazard or other condition detrimental to the safety or occupants or of firefighting personnel.</p> <p>8-302.4 Regardless of use, maximum floor area for a one-story historical is 15,000 SF. Increases according to prevailing code. <i>Exceptions: Historic building provided with an approved automatic sprinkler system may be unlimited in floor area without fire-resistive area separation walls.</i></p> <p>8-409: Fire Alarm System required.</p>
Occupancy Separation	Occupancies are "B" and "H5", with no occupancy separation.	<p><u>Separation Requirements Between Occupancies:</u></p> <ul style="list-style-type: none">A-2 or A-2.1 and B Occupancies: One-Hour Separation RequiredA-2.1 and E Occupancies: No Requirement for Occupancy Separation.B and E Occupancies: One-Hour Separation RequiredA-1 and B: Three-hour Separation <p><i>The existing structure does not have complying occupancy separations for proposed occupancy uses.</i></p>		<ul style="list-style-type: none">Sprinkler the building to reduce the required occupancy separation.	<p>Sec. 8-302.3: Required occupancy separations of more than one hour may be reduced to one-hour fire-resistive construction with all openings protected by not less than ¾ hour fire resistive assemblies of the self-closing or automatic closing type when the building is provided with an automatic sprinkler system throughout the entire building. Required occupancy separations of one hour may be omitted when the building is provided with an approved automatic sprinkler system throughout.</p> <p>8-402.2 Upgrading an existing qualified historic building or property to one-hour fire-resistive construction and one-hour fire resistive corridors shall not be required regardless of construction or occupancy when one of the following is provided:</p> <ol style="list-style-type: none">An automatic fire sprinkler system throughoutAn approved life-safety evaluation.Other alternative measures are approved by the enforcing agency.

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Accessibility	<p>The building is not ADA Compliant:</p> <ul style="list-style-type: none">No accessible restroomsNo accessible phonesNo drinking fountains, accessible or otherwiseNo accessible thermostats, light switchesThe second floor offices are not accessible. These are currently closed off to the public.Handrails, stairs and corridors are not ADA compliant.Floor is not level.	<p><u>Short-term:</u></p> <ul style="list-style-type: none">Non-accessible areas will remain closed to the public. (Use allowed in areas where clean-up and abatement has been performed.)Provide temporary, portable amenities that are handicap accessible for short-term events, as required.Level floor to eliminate tripping hazards.	<ul style="list-style-type: none">Provide facilities to accommodate disabled employees and visitors.	<p><u>Long-term:</u></p> <ul style="list-style-type: none">Provide facilities to accommodate disabled employees and visitors employing space planning that is sensitive to historic plan of the building.Cover floor-tripping hazards such as tracks and tie-downs in a manner that reveals their presence and is reversible.Provide elevator(s) as required to allow disabled users to gain access to upper floor public areas. (Additional work may be required to provide accessible routes through these areas.)	<p>8-602.1 The regular code for access for persons with disabilities shall be applied to qualified historical buildings or properties unless strict compliance with the regular code will threaten or destroy the historical significance or character-defining features of the building or property.</p> <p>8-602.2 Alternative provisions on a case by case basis. Requires documentation, reasons why alternative provisions are provided.</p> <p>8-603.2 <u>Alternative Doors:</u></p> <ul style="list-style-type: none">30” and 29 ½” single leaf doors accepted.Double doors, one leaf 29 ½” or power assisted with both providing total of 29 ½” opening.A power-assisted door or doors may be considered an equivalent alternative to level landings, strike side clearance and door-opening forces required by regular code. <p>8-603.4 Toilet rooms: Unisex facilities may be designated.</p> <p>8-603.5 <u>Exterior and Interior Ramps:</u></p> <ul style="list-style-type: none">Ramp slopes no greater than 1:10, not to exceed 12 feet.Ramps of 1:6 slope not to exceed 13 inches. <p>8-604 Equivalent Facilitation: Alternatives on case by case basis. Alternatives will provide substantially equivalent or greater accessibility to, and usability of, the facility.</p>
Energy					<p>8-901 Historic buildings exempt from compliance with energy conservation standards. New appliances/equipment added should comply with regular code.</p>
Hazardous Materials	<ul style="list-style-type: none">VCT flooring in many areas, assumed to contain asbestos. Many areas in building have loose and damaged tiles that may require abatement.Transite siding and pipe laggings are friable in some locations.1993 Buildings inside of hangar were sampled and confirmed to contain asbestos.Sheathing of Hangar One is coated with a silver coating, which may contain asbestos.	<p><u>Short-term:</u></p> <ul style="list-style-type: none">Lead clean-up as funds are available. <p><u>Long-term:</u></p> <ul style="list-style-type: none">Anticipated removal of interior asbestos containing materials when hangar is converted to new use through removal of buildings inside hangar.Anticipated maintenance, not removal, of lead-based paint to avoid problems associated with deterioration, peeling and cracking.	<p><u>DMJM:</u></p> <p><u>Short-term:</u> The only possible abatement action that can be foreseen is removal, from ground level to about 8 feet above ground, of the silver coating on the outside of the hangar assumed to contain asbestos.</p> <p><u>Long-term:</u> If Hangar One is converted to public use, an asbestos survey of the hangar should be conducted after demolition of the existing in-hangar buildings.</p>	<ul style="list-style-type: none">Will need survey for PCB’S.Maintenance and replacement of damaged exterior panels containing asbestos with aesthetically similar panels compliant with current standards. Maintenance and replacement decisions can be made with the advice of a specialist in this area.	

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	<ul style="list-style-type: none">Possible PCB (polychlorinated biphenols) in the floor or soil associated with the electric transformers near the large motors that operate the hangar doors.Lead found on floor. South half of the hangar has been cleaned.Peeling paint assumed to contain lead, throughout.Fire Suppression system is CO2 system in certain areas of the Hangar. Areas where this system exists, have been closed off.	.			
Light and Ventilation			<u>DMJM:</u> <ul style="list-style-type: none">Maintain existing light and ventilation.Supplement existing light and ventilation. Additional electrical and mechanical to provide required minimum level of light and air circulation.	<ul style="list-style-type: none">Supplemental ventilation will defer to the historic character of the building.Any new penetrations to the skin of the building shall not be done without prior consent of the building officials and SHPO.Supplemental lighting will integrate with the industrial vocabulary of the building.New equipment appliances shall be vented properly so as not to create fire hazards.	8-302 Existing provisions for light and ventilation which do not, in the opinion of the enforcing agency, constitute a safety hazard may remain.
Weather Protection	<ul style="list-style-type: none">Existing roof leaks.Possible black mold at leaks.East entrance: Roll-up door permanently held open via new columns.	<u>Short-Term:</u> Make necessary repairs as funds become available. <u>Long-Term:</u> Repairs made as per DMJM's recommendation.	<u>Kaiser & Folsom:</u> <ul style="list-style-type: none">Repair leaks.Abate areas containing black mold. <u>DMJM:</u> <ul style="list-style-type: none">Scope of work related will be met through rehabilitation of the existing building skin and window openings.	<u>Short-Term:</u> <ul style="list-style-type: none">Repair leaks.Repair details approved by building officials and SHPO. <u>Long-Term Use:</u> <ul style="list-style-type: none">Remove columns. Restore entrance.	8-408 The original or historic roofing system detailed/modified as necessary to provide shelter to the building occupants and exclude dampness, while preserving the historic materials and appearance of the roof.
Civil	<ul style="list-style-type: none">No formal civil survey of the existing conditions has been conducted.Existing storm drain may not have adequate capacity for severe 25 year storm.	<u>Short-Term Use:</u> <ul style="list-style-type: none">May need to upgrade the storm drain, based on a formal civil survey. <u>Long-Term Use:</u> <ul style="list-style-type: none">All proposed re-use conditions will take place within Hangar. Therefore, the existing storm drain will not be impacted.Additional sewer lines may be required to meet re-use conditions.Water mains may need to increase in size to support new occupancy.Clean and repair existing utilities. Verify proper operations.	<u>DMJM:</u> <i>DMJM's response was based on original design drawings. No formal survey was conducted to verify existing conditions.</i> <ul style="list-style-type: none">There does not appear to be any civil conditions that would prevent the re-use of Hangar One as a public building.Calculate occupancy and fixture units required. Compare with capacity of existing sewer lines.Increase water main to meet new demand.	<ul style="list-style-type: none">Civil Survey to confirm existing conditions and identify deficiencies.Civil upgrades to be approved by Building Official and SHPO.Any new construction adjacent to the building must be carefully reviewed by the Fire Marshall.Only construction that is deemed necessary and for the purpose of serving the building should be allowed. Any new construction shall be planned so as not to diminish any space dedicated to fire truck use.	8-1001 Alternative regulations and criteria shall apply to all sites, open space, access ways, artifacts and landscape areas associated with qualified historical buildings or historic districts. 8-1002 The relationship between a structure and its site is important and of special importance in historic districts.

Summary

A cross examination of Hangar One's code deficiencies with possible allowances made available to historic buildings by the State Historic Building Code revealed three important points:

1. The intention of the State Historic Building Code "to save California's architectural heritage by recognizing the unique construction problems inherent in historical buildings and by providing a code to deal with these problems".
2. An approved Automatic Sprinklering system installed throughout Hangar One provides several allowances.
3. In evaluating the hangar for code compliance, the goal should be the achievement of an *equivalent* level of safety rather than strict code compliance.

Certainly, the first step in the protecting the historic integrity of Hangar One is to recognize the contributing elements. These are described in detail in the Survey of Hangar One. Among the most import of these are: the exterior metal skin, the hangar doors, the arched structure, the interior metal walls, the catwalks, and the elevators. These make up the framework around which one must work in order to adapt the hangar to a new use as well as preserve its history. Page & Turnbull recommends that these contributing architectural elements be preserved as plans are made to rehabilitate Hangar One for a new use. The structural integrity of the arched framework should be reevaluated when the hangar adapted to its new use. Any structural upgrades that are made should be limited only to correct unsafe conditions.

While it makes sense to remove the much altered office spaces within the metal walls, the metal wall themselves should be preserved whenever possible. The skin of the hangar as well as the metal windows should be protected. New penetrations to the hangar should be planned with care in order to preserve these elements as well as the hangar's aesthetic character. Any new additions and alterations will be required to adhere to the current code regulations and should be reversible.

As stated in the second point, a sprinkler system for Hangar One will not only provide many allowances, it will enable the hangar to retain those elements that contribute to its historic character intact. The design of a sprinkler system for Hangar One certainly raises many questions that are beyond the scope of this report. The proper implementation of such a system is so critical that Page & Turnbull recommends that a fire consultant work closely with the designer of the sprinkler system to ensure the efficacy of the system.

The addition of a sprinkler system throughout the hangar will not provide any code allowance with regards to the required number of exits. The design of the hangar, however,

provides obvious locations for new exits. These should be limited to the location of the metal framed windows. In addition, placement of main entrances for the permanent reuse of the hangar should consider the master planning of the site as a whole.

To compensate for the immense size of the hangar, any reuse of the hangar should employ an egress design that is efficient and clear to even the first time visitor. The egress system should be enhanced with state of the art signage, detection, alarm and annunciation (voice notification) systems. Special attention should be given to any exhibits that would obstruct the flow pattern of the sprinklers.

The third point state emphasizes that the historic buildings need not adhere to code requirements, but rather seek alternatives that bring the building to a level of equivalent safety. NASA building officials should work closely with a fire-protection consultant and perhaps even a risk management consultant in order to determine what a level of *safety equivalence* means for Hangar One. Obviously, safety solutions that do not diminish the historic character of the building should always be sought and considered. An example of this would be to determine an effective way to sprinkler the building instead of adding fireproofing material that would hide significant elements of the building. Another example is to explore the possibility of employing co-equal entrances as an alternative to having a main exit that handles 50% of the total occupant load.

The challenge of the adaptive reuse of Hangar One is a great, but commendable one. The rehabilitation of the hangar can be accomplished employing current code requirements in combination with the State Historic Building Code and life-safety consultants. In addition, seeking the advice of the State Historic Preservation Office, will ultimately result in the building's preservation and assure future generations the benefit of its use.

RE-USE GUIDELINES

Appropriate Uses

The purpose of these guidelines is to provide a descriptive and illustrative tool when considering the adaptive re-use of Hangar One. Program combinations that benefit from the tremendous interior space, yet allow the hangar to be used without severe alteration to the exterior skin and structural framework, are discussed. With regard to land use, each program scheme has potential environmental implications to both the site and the Moffett Field district in addition to the hangar itself; however, these will not be evaluated in this report.

The re-use of the hangar is critical to any effort to preserve and utilize the structure. Recent decades of moderate use and low maintenance have contributed to the development of deterioration, leaks, rusting, and failing equipment. Thorough investigation and documentation of areas requiring repair as well as thoughtful planning and design will be necessary to formulate a repair and maintenance plan for the building. This planning will need to happen concurrently with the development of new programmatic uses for the building and other improvement programs set up for the hangar.

Appropriate uses are organized into Short, Intermediate, and Long Term Schemes. These combinations are diagrammatic in nature and are informed by information gathered from NASA and DMJM regarding current one-time events, occupancies under consideration, and desired occupancies for the long term.

All Short Term Scenarios have the following in common:

- Moffett Field Historical Society remains in Hangar One, in its present location.
- The northern half of Hangar One remains closed to the public due to hazardous materials.
- No public access is provided to the mezzanine, second floor, third floor and catwalks.
- Existing exits are utilized (including one to be built summer/fall of 2001).
- The first floor offices and workshops, south half of the hangar only, within the metal walls are cleared and cleaned as necessary to allow their use as storage and support.

- Lit exit signs are placed at the entrance to the exit corridors.
- Improvements to the hangar are assumed to be minimal.
- The Support Category includes restrooms, telephones, drinking fountains, etc.

Short Term: Scheme 1

This scheme depicts a dinner event with fewer than 2880 participants. The main entrance to the event is at the overhead doors, east side, between Column Lines 8 and 9. This scheme employs a careful seating arrangement designed to emphasize and clarify the location of the exits. The six exits on the east and west side of the hangar are used. The south hangar doors are not needed as part of the required exit width; but, could remain open during the event.

The support category is shown at the perimeter of the seating, with care not to obstruct the visibility of any of the required exits. The storage category could be used by the event client as well as the support staff in charge of Hangar One. In this scenario, storage is placed at the perimeter offices and workshops within the metal walls.

Short Term: Scheme 2

This scheme is similar to the scheme above, except that the dinner event grows to over 2880 participants. In this scenario, the south hangar doors remain open to allow their use as an exit. The same concept as Scheme 1 is used.

Short Term: Scheme 3

This scheme represents a scenario in which the hangar is leased for a week for exhibition and educational purposes. It is assumed for this scheme that in addition to the large exhibition spaces, large blocks of space would be allocated for formal talks and classes. These areas are separated with buffers of exhibition and support blocks. A break area is provided for at the south hangar doors. Since the hangar doors are kept in the open position for this scheme, it is assumed that some of the break area would spill outside of the hangar. The support areas are kept mostly at the perimeter of the event. Circulation is designed to emphasize the location of the exits.

Intermediate Schemes

All Intermediate Schemes have the following in common:

- Moffett Field Historical Society remains in Hangar One, in its present location.

- PWII Buildings within the high bay are removed.
- The northern half of Hangar One is cleaned and full access to the first floor, high bay area, is allowed.
- No access to the mezzanine, second floor, third floor and catwalks is provided.
- Additional exits are added to bring the required exit width up to the code requirement. These exits are placed within the window bays.
- No new penetrations to the skin of the hangar.
- The first floor offices and workshops, both north and south, within the metal walls are cleared and cleaned as necessary to allow their use as storage, support and leaseable space.
- Installation of a sprinkler system to all areas leased on intermediate basis.
- Repair of the hangar is completed as required for occupancy.

Intermediate Term: Scheme 1

The scheme depicted is one in which the part of the hangar is leased out to small businesses for two to five years. In this scenario, the businesses lease part of the old office and workshop space contained within the metal walls. Support for the businesses is adjacent to them and the exits. The exits would also serve as private entrances for the businesses leasing the space.

The north half of the high bay is left open and available to be leased for short-term events. In this scenario, a major conference/exposition, such as a computer and technology exposition, is shown. The program would include spaces for exhibition, conferences and theater-style assembly. The conference and assembly spaces would be buffered by exhibition and support spaces.

The south half of the high bay is leased to a higher education entity, such as a community college, for two to five years. The scheme shows program spaces dedicated to classroom, resource and library, administration, as well as storage and support.

Both the north and south hangar doors would be held in the open position during the exposition event. The south hangar door would be held in the open position depending on the size of the education program. The question of a possible wind tunnel effect resulting from both hangar doors in the open position has been raised. If a design scheme similar to

this scheme is pursued, this issue would require further investigation and as well as consulting with an expert in this field.

Intermediate Term: Scheme 2

In this scheme, a temporary museum is shown. The majority of the space within the high bay is dedicated to exhibition space. The scheme also provides for auditorium assembly spaces as well spaces for education/classroom.

The primary entrance for the museum is at the south hangar doors. Secondary entrances are located mid-hangar on the east and west sides between column lines eight and nine.

The hangar doors at the south end and north end would remain in the open position during museum hours. The space at the north hangar doors provides the setting for a large auditorium. Lobby/circulation spaces are provided at the south hangar doors, at the center of the hangar and in close proximity to the large auditorium space at the north of the building. All main circulation is designed to emphasize the exits.

The generous lobby at the south end is intended to provide tables for casual dining and additional exhibition space. Since the doors are held in the open position, both the tables and the exhibition at this end of the hangar could spill outside of the hangar.

Offices and administration are placed throughout the hangar for control purposes.

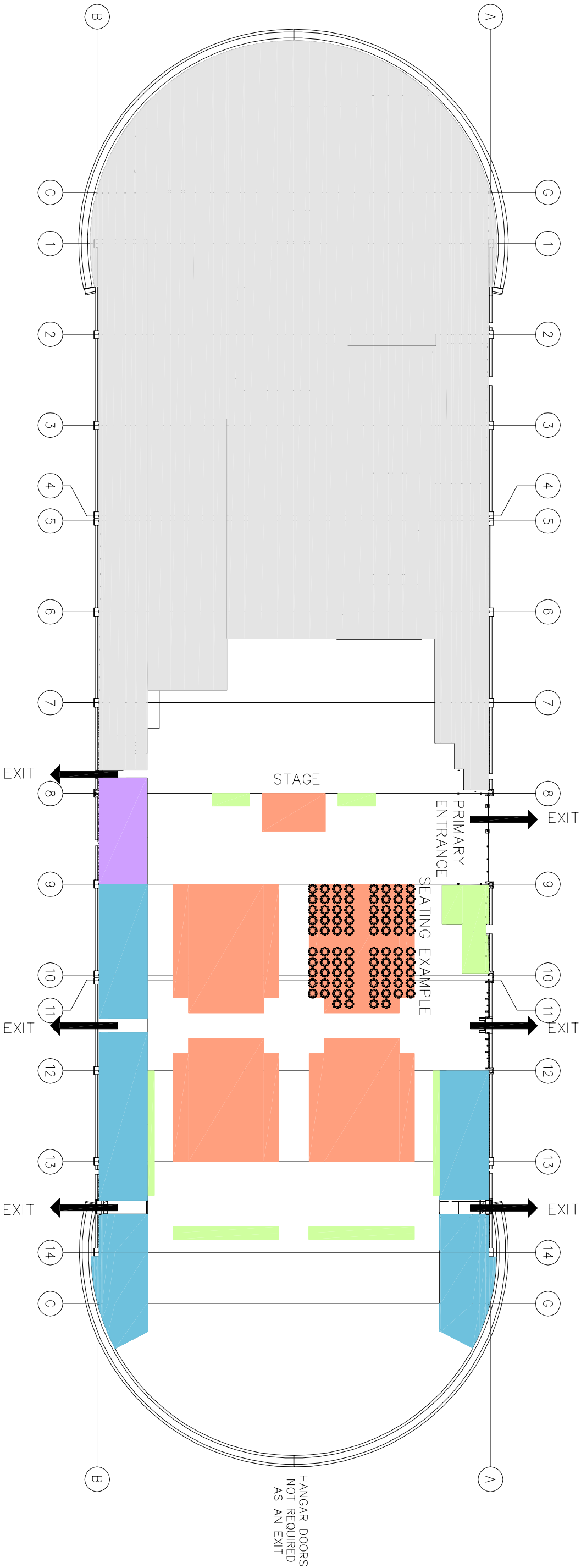
Long Term Scheme

For this scheme, the hangar is fully rehabilitated and adapted to a museum, following the guidelines set forth by the California Historic Building Code. The south hangar doors are treated as the primary entrance with possible secondary entrances mid-hangar, east and west sides. The greater part of the hangar is used for exhibition space, but a generous auditorium is placed at the north end of the hangar. Support spaces are evenly distributed and placed at circulation arteries.

The scheme has three separate retail and restaurant spaces with casual seating in close proximity. As with the intermediate scenario, Scheme 2, the lobby at the south end is intended to spill outside with additional outdoor seating and exhibition space.

The design of the egress system is based on exits that are predictably spaced and clearly visible to the user from within the high bay.

A new full height glazed wall is envisioned at the south end of the hangar that would serve as the south exterior wall and the main entrance to the hangar. The south hangar doors would remain open permanently. This wall would contain ample exiting and prevent the alteration of the existing hangar doors for purposes of exiting.



SHORT TERM SCHEME 1
DINNER EVENT UNDER 2880
MOFFETT FIELD HISTORICAL SOCIETY REMAINS

LEGEND



CLOSED AREA



EVENT



EXHIBIT



STORAGE



SUPPORT

33,800 SF

3,200 SF

20,500 SF

5,000 SF

2,250 Occupants

200 Occupants

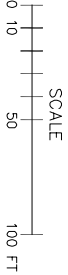
75 Occupants

50 Occupants

TOTAL 2,575 Occupants = 43' Min. Exit Width (0.2in/person)

SHORT TERM: SCHEME 1

FIRST FLOOR PLAN



SCALE

100 FT

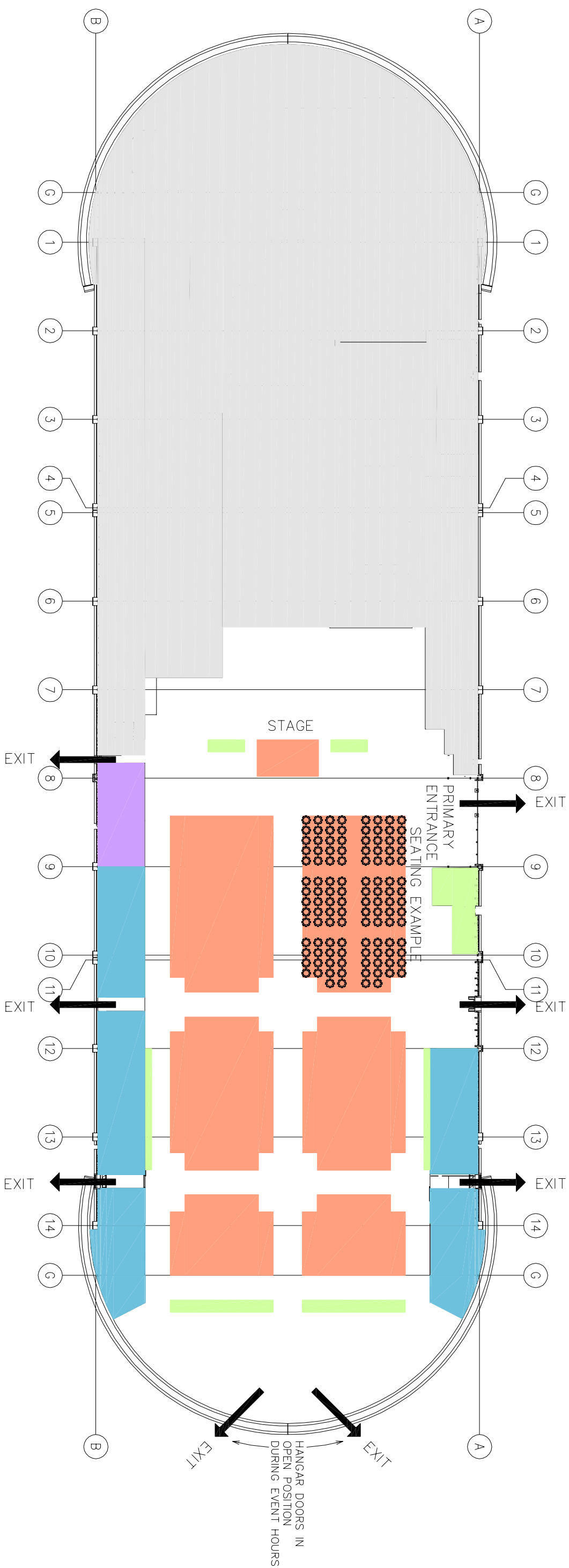
50

10

0



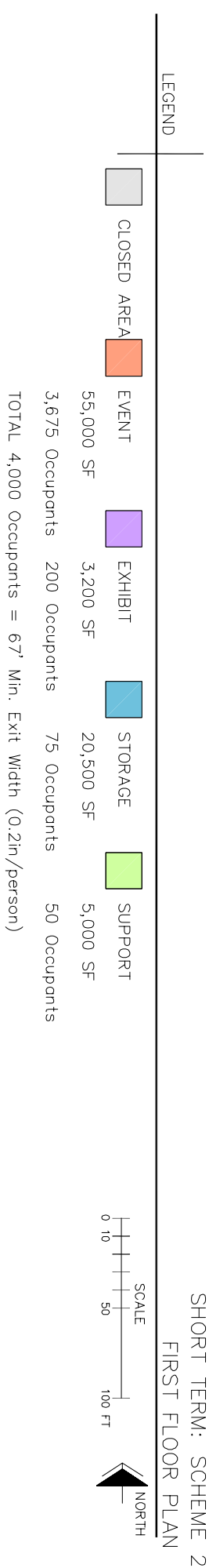
NORTH

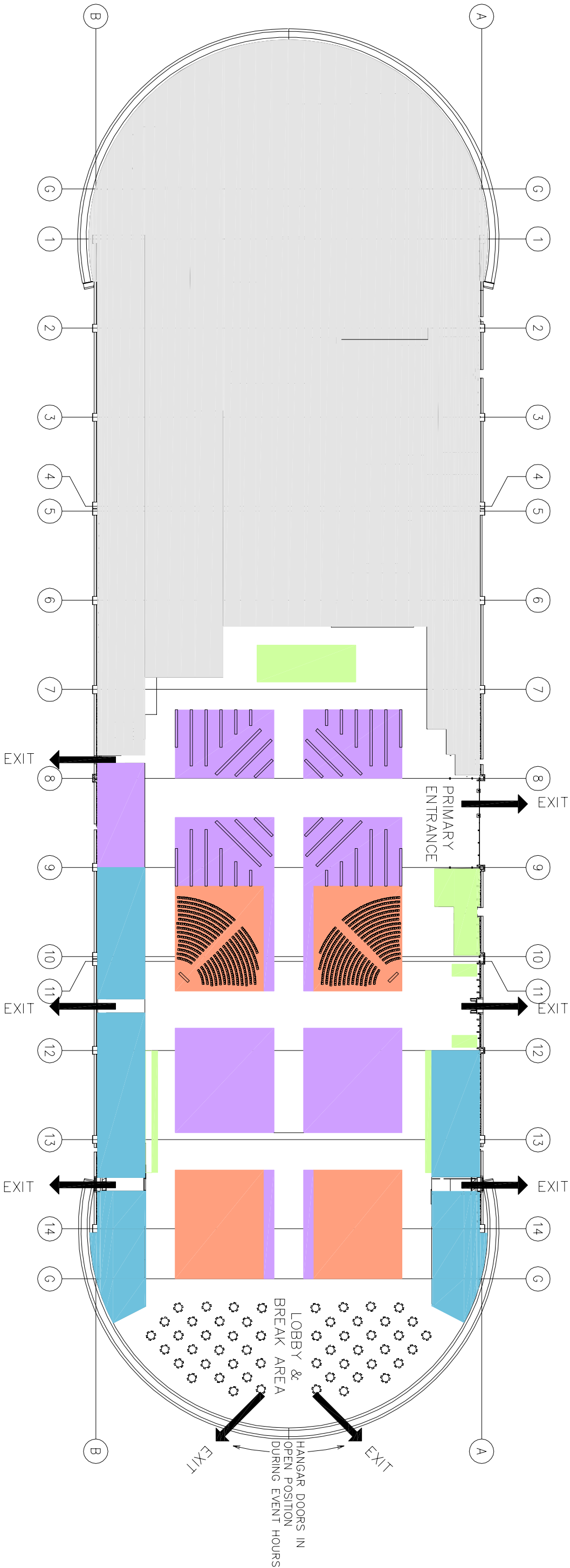


SHORT TERM SCHEME 2

DINNER EVENT OVER 2880







MOFFETT FIELD HISTORICAL SOCIETY REMAINS



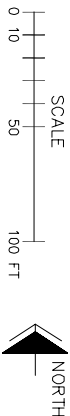


SHORT TERM SCHEME 3
EDUCATIONAL/EXHIBIT SPACE: LEASABLE FOR 2-5 DAYS
MOFFETT FIELD HISTORICAL SOCIETY REMAINS

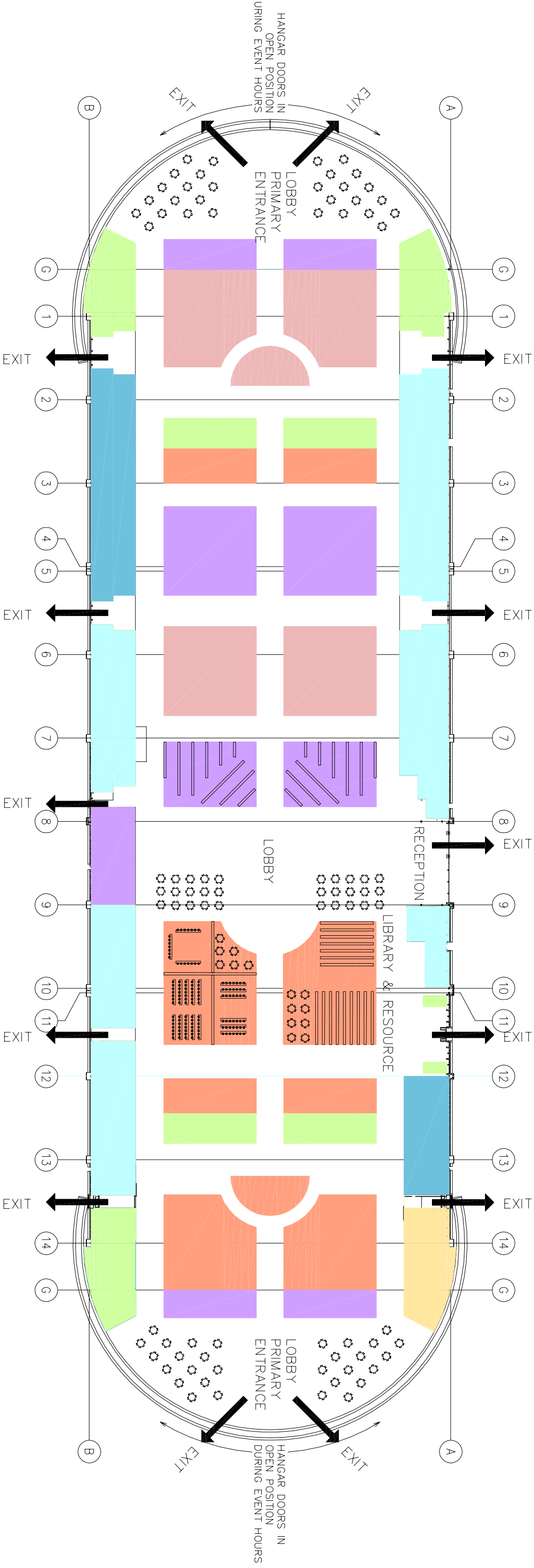
LEGEND

	CLOSED AREA		OPEN CLASSROOM		EXHIBIT
	24,750 SF		37,000 SF		2,450 Occupants
	1,225 Occupants				
	STORAGE		SUPPORT		BREAK AREA
	20,500 SF		5,650 SF		10,500 SF
	75 Occupants		50 Occupants		700 Occupants

TOTAL 4,500 Occupants = 75' Min. Exit Width (0.2in/person)



SHORT TERM: SCHEME 3
FIRST FLOOR PLAN



INTERMEDIATE TERM SCHEME 1

PERIMETER LEASED TO SMALL BUSINESSES

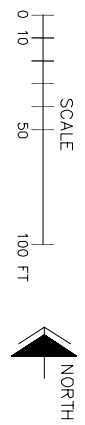
SOUTH HANGAR LEASED TO HIGHER EDUCATION ENTITY

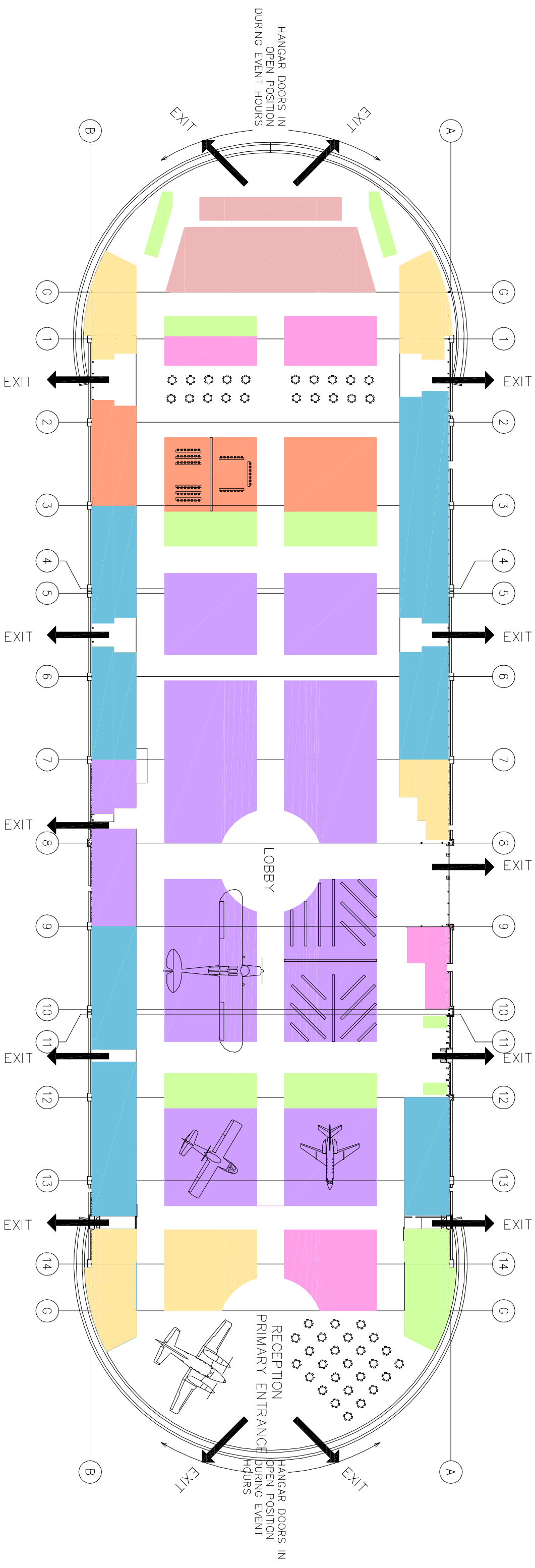
NORTH HANGAR FOR SHORT TERM EVENTS

MOFFETT FIELD HISTORICAL SOCIETY REMAINS

INTERMEDIATE TERM: SCHEME 1
FIRST FLOOR PLAN

LEGEND			
<div></div>	ADMINISTRATION	<div></div>	EDUCATION & CLASSROOM
4,000 SF		39,000 SF	
40 Occupants		1,950 Occupants	
<div></div>	THEATER SPACE	<div></div>	STORAGE
26,500 SF		11,500 SF	
3,785 Occupants		35 Occupants	
<div></div>	EXHIBIT	<div></div>	SUPPORT
32,000 SF		18,775 SF	
2,135 Occupants		190 Occupants	
<div></div>	SMALL BUSINESS	<div></div>	BREAK AREA
30,500 SF		27,750 SF	
305 Occupants		1,850 Occupants	
TOTAL 10,300 Occupants = 175' Min. Exit Width (0.2in/person)			



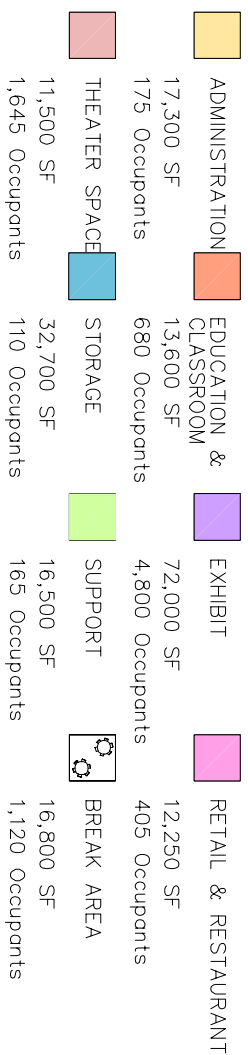


INTERMEDIATE TERM SCHEME 2

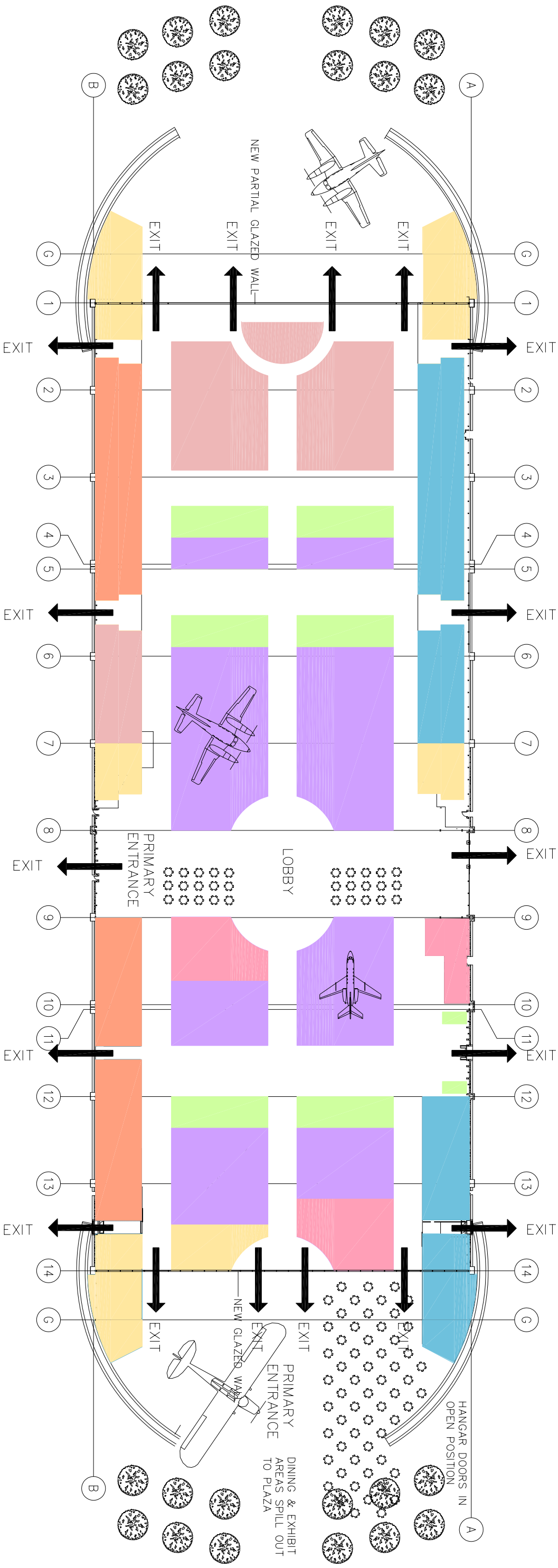
EDUCATIONAL/TEMPORARY MUSEUM SPACE

MOFFETT FIELD HISTORICAL SOCIETY REMAINS

ALL POST WWII BUILDINGS ARE DEMOLISHED



TOTAL 9,100 Occupants = 152' Min. Exit Width (0.2in/person)



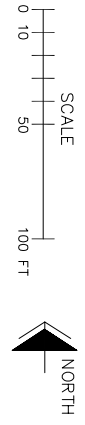
LONG TERM: SCHEME 1

CASC MUSEUM:
EXHIBITION SPACES, CLASSROOMS, THEATER SPACE
MOFFETT FIELD HISTORICAL SOCIETY RELOCATED

LEGEND

	ADMINISTRATION & OFFICES 17,400 SF 175 Occupants		EDUCATION & CLASSROOM 16,550 SF 825 Occupants		EXHIBIT 54,250 SF 3,600 Occupants		RETAIL & RESTAURANT 9,745 SF 325 Occupants
	THEATER SPACE 21,250 SF 3,035 Occupants		STORAGE 7,915 SF 25 Occupants		SUPPORT 12,640 SF 125 Occupants		BREAK AREA 17,200 SF 1,150 Occupants

TOTAL 9,260 Occupants = 155' Min. Exit Width (0.2in/person)



LONG TERM: SCHEME 1
FIRST FLOOR PLAN

Common Considerations

Exterior Skin Penetrations and Exits

As the exterior “streamline” profile is one of the most significant features of Hangar One, care should be taken when rehabilitating or altering the exterior skin. As new doors, windows, and other penetrations become necessary, they should be located within the glazed strip window portion of the elevation rather than through the corrugated panels. They should be aesthetically consistent and sympathetic to the hangar. Primary entrances and exits should be spaced along the east and west elevation following a rhythm that is methodical. This will provide an easily understood circulation framework for the building that is helpful to the first-time visitor as well as respond to the regular bay organization of the building’s structure and aesthetic. Secondary entrances and exits should be provided at existing openings. Miscellaneous equipment penetrations should be consolidated to specific areas, preferably at a window bay corner.

Currently there are many locations in the glazed strip window bays where solid glass has been replaced with louvers. The louvers, like other miscellaneous penetrations, occur randomly along the elevation and contribute to a cluttered appearance. When consulting with heating, conditioning and ventilation designers an effort to combine these air intake locations and minimize their impact on the elevation should be implemented to preserve the clean lines of the building exterior.

Metal Wall Penetrations

The interior metal walls which originally housed shop and office area along the east and west sides of the hangar create an interesting juxtaposition to the interior curvilinear space. They are set within the lower rectilinear portion of the 3-hinged arch below the spring point and create a base for the arched profile. The area behind the metal walls is a suitable location for program area requiring enclosed spaces, enabling the center zone to be clear or available for open seating, exhibit, or flexible use more appropriate to the voluminous space.

Openings through the metal walls should be deliberately placed and large in scale, proportioned comparable to the original sliding doors that are still in place. Smaller single door penetrations should be avoided, except where structure and clearance do not permit otherwise.

Accessibility

The hangar must have access to and use by persons with disabilities. Exits, doorways, circulation pathways, public and private spaces, toilets and support facilities, parking and exterior pathways are all required to comply with the California Building Code and Title 24 accessibility requirements. The California Historical Building Code does provide alternatives to the code when strict compliance will threaten or destroy the historical significance or character-defining features of the building. These alternatives are considered on a case-by-case basis. However, in general it should not be difficult to comply with the code given the vast space available at the hangar. Code complying stairways and elevators can be inserted between the structural elements. Circulation pathways and accessible toilets, telephones, and support features can be designed into the reuse plans.

There are some examples that will require thoughtful design to ensure full accessibility while maintaining historic fabric of the building. Surviving tie-downs within the concrete floor should to be preserved and perhaps encapsulated under a glazed or clear ceramic material to allow a smooth walking surface and the continued appreciation of the building's past purpose. Upper levels, mezzanines, and catwalks when open to the public will need to incorporate smooth walking surfaces, guardrails, handrails, and adequate safety measures while maintaining the open nature of the structure.

Signage

Clear identification for way finding throughout the building is essential for the occupation of the hangar. Exits and pathways must be identified with signage that is legible from a distance and is lit with a battery or emergency back-up source of power. Informational signage will direct occupants to their destination and prevent confusion. Maps of the building and contrasting symbols identifying public services such as toilets and telephones will communicate graphically to the user. Audible communication is also important for high density program areas. This entire signage assembly should make use of color and design to create a consistent theme to the signage, and assist in creating an identity for the hangar's new use.

Lighting

Daylighting as a primary means to light the main interior space during daylight hours should be maintained. Supplemental lighting of the interior, spot lighting, and accent lighting will be important during daylight and evening hours. At least two types of original lights exist at the hangar and should be preserved: explosion proof fixtures at ground level and flood

fixtures at the south end of the hangar (see survey photographs #54 and #56). New fixtures that continue this lighting effect, as well as others that serve the programmatic use of the building will need to be added in a complementary style. Fixtures that mimic the existing historic lights should be avoided.

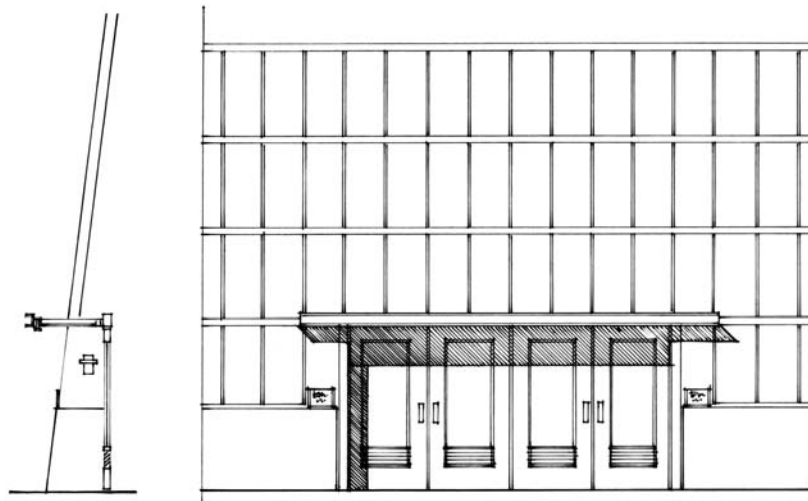
Equipment and Services

Consideration should be made to locate mechanical, electrical, plumbing mains, and miscellaneous building equipment lines where appropriate under the ground floor level. One service tunnel exists housing old steam lines serving Hangar One and other nearby buildings, but it is now apparently used only for drainage purposes. There is ample opportunity to place additional service tunnels under the hangar and locate necessary building infrastructure remote from historic fabric and inconspicuously out of public view. Underground tunnels would have the added benefit of providing service access to the open interior area of the building.

Equipment, mechanical lines, and maintenance structures to the exterior of the building are particularly important to locate away from public circulation and view, both for aesthetic and safety reasons. The perception of the hangar from the west is currently blocked with these types of structures interrupting the smooth lines of the building's curvilinear profile. Clear distance on all sides of the building should be preserved, consistent with the historical siting of the hangar.



Locate entry doors within window bay –
entrance proportion to align with window module



Provide awning for
weather protection

Lighting at awning
and sides of entrances

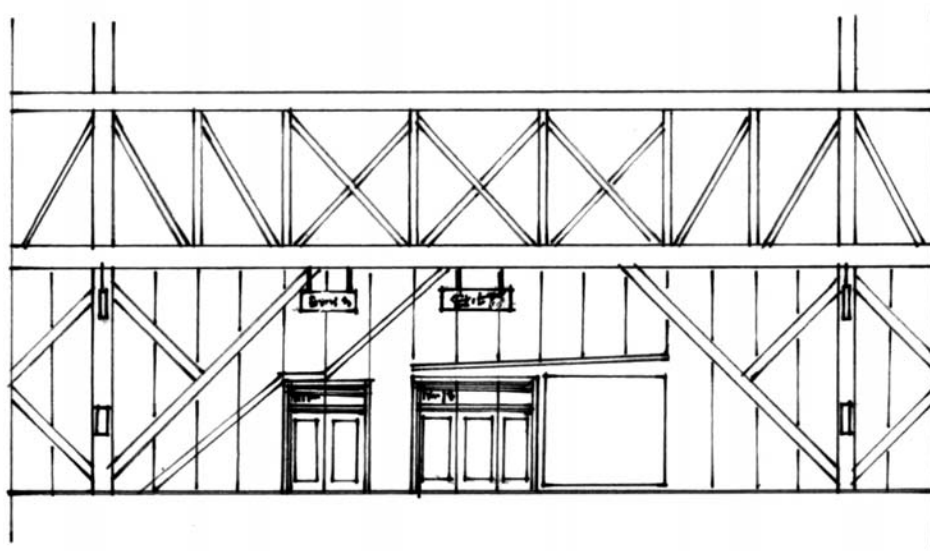
Signage clear from glass

Provide glazing and
ventilation within door unit



Historic metal shop walls
with original Shop Sliding Door

Non-historic offices

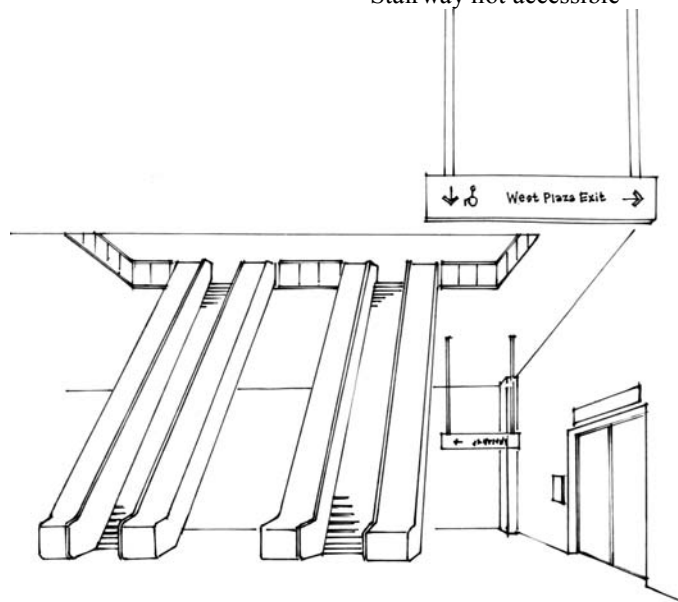


Signage anchored to structure
and clear from walls

Doorways at scale
of sliding door



Stairway not accessible



Accessible circulation

Suspended signage

Integration of New Architectural Form into Existing Fabric

New Construction

New construction must follow the guidelines outlined in the Secretary of Interior's *Standards for Rehabilitation*. The new work shall be distinct from the historic fabric and be of a compatible nature. It should be done so as not to harm any existing historic fabric, and be reversible, in order to allow for future removal without disruption to the historic property. Considering the hangar's primary historic fabric as the structure, skin, and resulting interior open space of the building, the aim of any new construction should be to allow these elements to be readable despite new additions to the space.

Construction of lightweight, flexible, and perhaps temporary assemblies within the former shop/office areas and within in central bay area is a possible approach. The hangar provides primary weather protection for the interior. New additions can be designed without formidable walls and roofs and provide these features purely based on the need of the program. Aesthetic, environmental control and sound considerations will be more important factors for selection and design. This new construction should touch lightly upon the historic structure and exterior walls. It should be able to be removed without harm to the historic fabric if required in the future.

Open plan configurations are ideal for the central bay area. Minimizing new construction volume will assist in preserving the clear high volume and views along the long axis of the building. Open plan arrangements will also enable cross circulation to occur more freely, and is the plan concept appropriate to the new uses described for the hangar above.

The addition of new upper level walkways, mezzanine areas, or bridges should be designed to appear distinct from the historic structure. Careful consideration will be required where these elements cross the central bay area. Although a certain amount of cross circulation at upper levels may be necessary to meet high occupancy demands for the space, the open clear span of the building is the hangar's most impressive feature. Any compromise to this effect will affect the historic character of the interior space.

Materials and Vocabulary

The functional nature of the aircraft hangar has dictated an engineering approach to the materials and vocabulary of the building until the post WWII period. The primary material throughout the building is steel, used for the structural components, stairways, catwalks, and

walls. Other construction materials found at the hangar include glass, corrugated galbestos panels, steel and gypsum board composite panels, some wood framing (primarily at the roof), hollow clay tile, and concrete (for foundations). More recent infill buildings and offices show little consideration in working with these or similar materials, and are poor examples of appropriate construction.

Materials that are compatible with the industrial nature of the building, such as steel, metal, glass, and composite panels, are examples that might be used in a suitable design. The functional aspect of the materials and their arrangement should be emphasized.

Continuing Improvement Programs

As part of a complete preservation effort for Hangar One, Page & Turnbull recommends the following action plans be implemented:

- A repair and maintenance plan.
- Hazardous materials abatement/containment plan.
- Structural analysis (with an emphasis on the historic structure of the hangar).
- Fire suppression plan.
- Risk management plan.

Concluding Remarks

the interior space, its open flexible plan, natural daylighting, and its industrial character. Its most important and interesting feature, however, is its historic merit. The building is extremely significant as a contributing building to the Moffett Field Central Historic District on the *National Register of Historic Places*, a Naval Historical Landmark, a California Historic Civil Engineering Landmark, and as a building that is eligible for an individual listing on the *National Register*. It is a primary example of an arched type hangar, only one of two constructed in the country to house the dirigible type aircraft. It has been used for various purposes by the Navy and NASA until recently, and remains in good condition. Its history of accommodating uses other than aviation, as well as its structural integrity, make Hangar One an excellent candidate for reuse. The continued use of the building will be crucial to its preservation and continued appreciation.

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APPENDIX A

ORIGINAL DOCUMENTS

Drawing 1: Early Historic Site Plan, No Date Available (Hangar One Area Missing)

Drawing 2: Railroad Track Layout, 1931

Drawing 3: Plumbing Plan, 1932

Drawing 4: Hangar Foundations, 1931

Drawing 5: Heating Plan, 1932

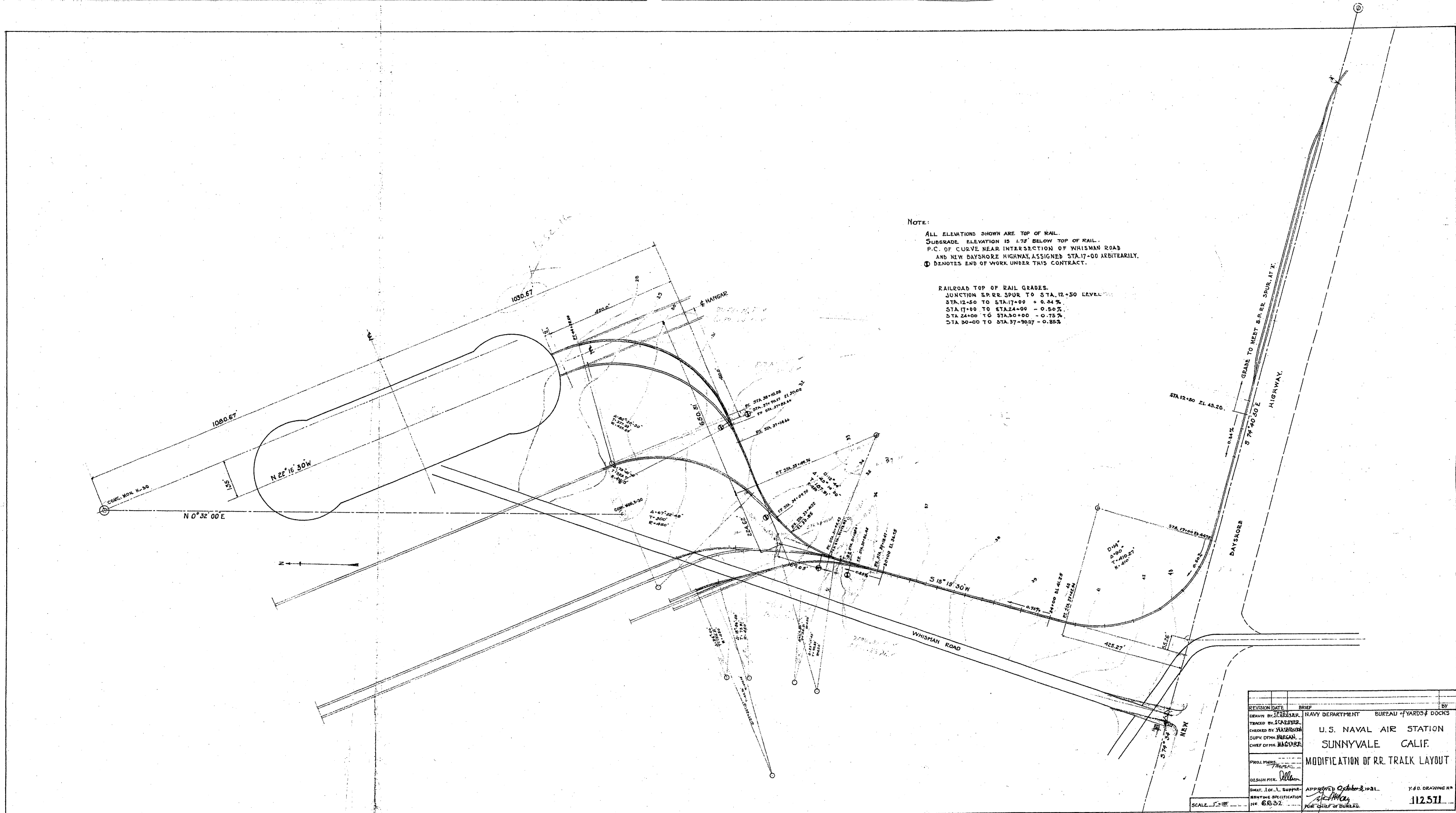
Drawing 6: Gable Arch, 1931

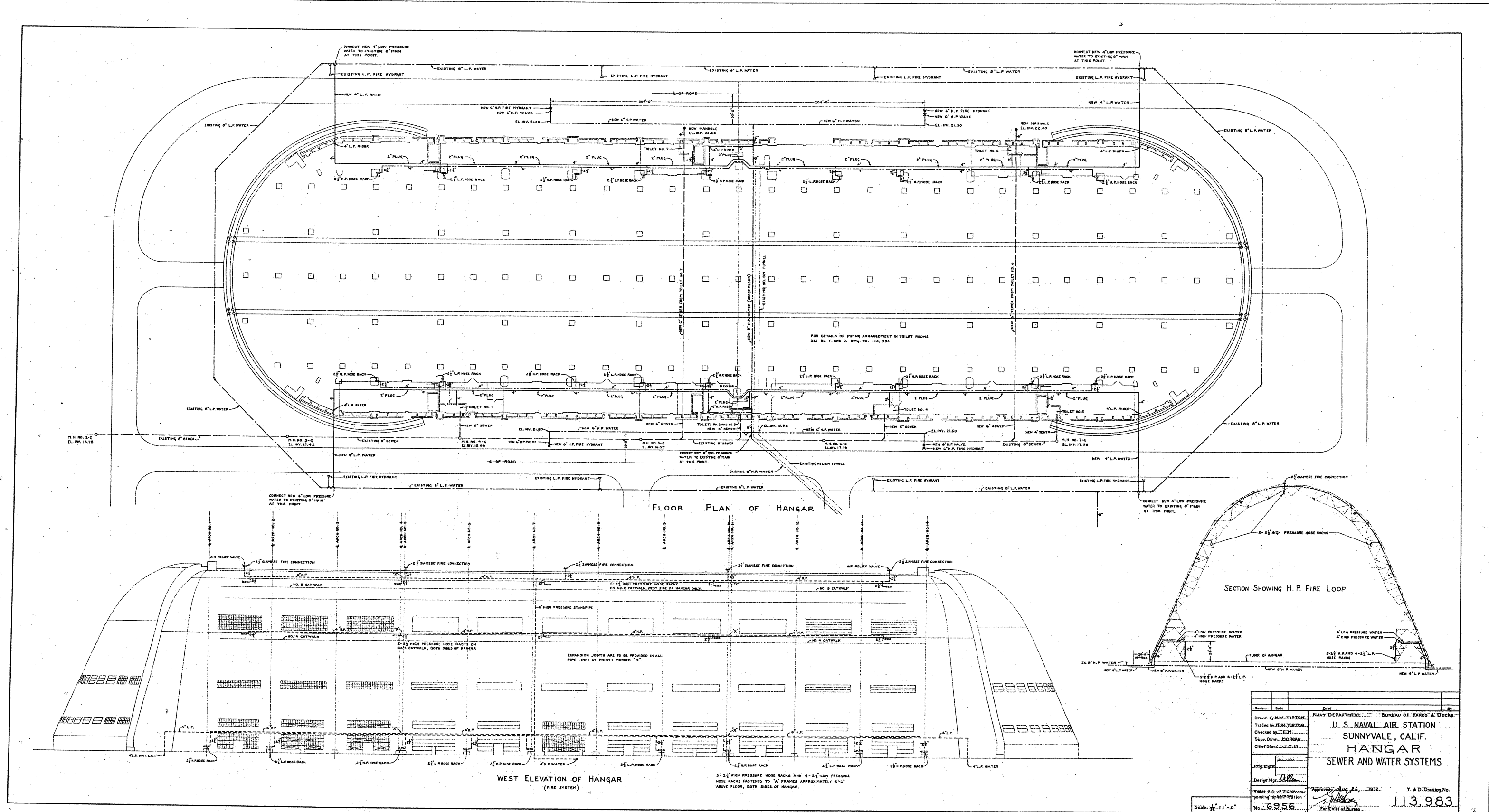
Drawing 7: Elevation of Arch Peak, 1943

Drawing 8: Section of Stairs and Elevators, 1931

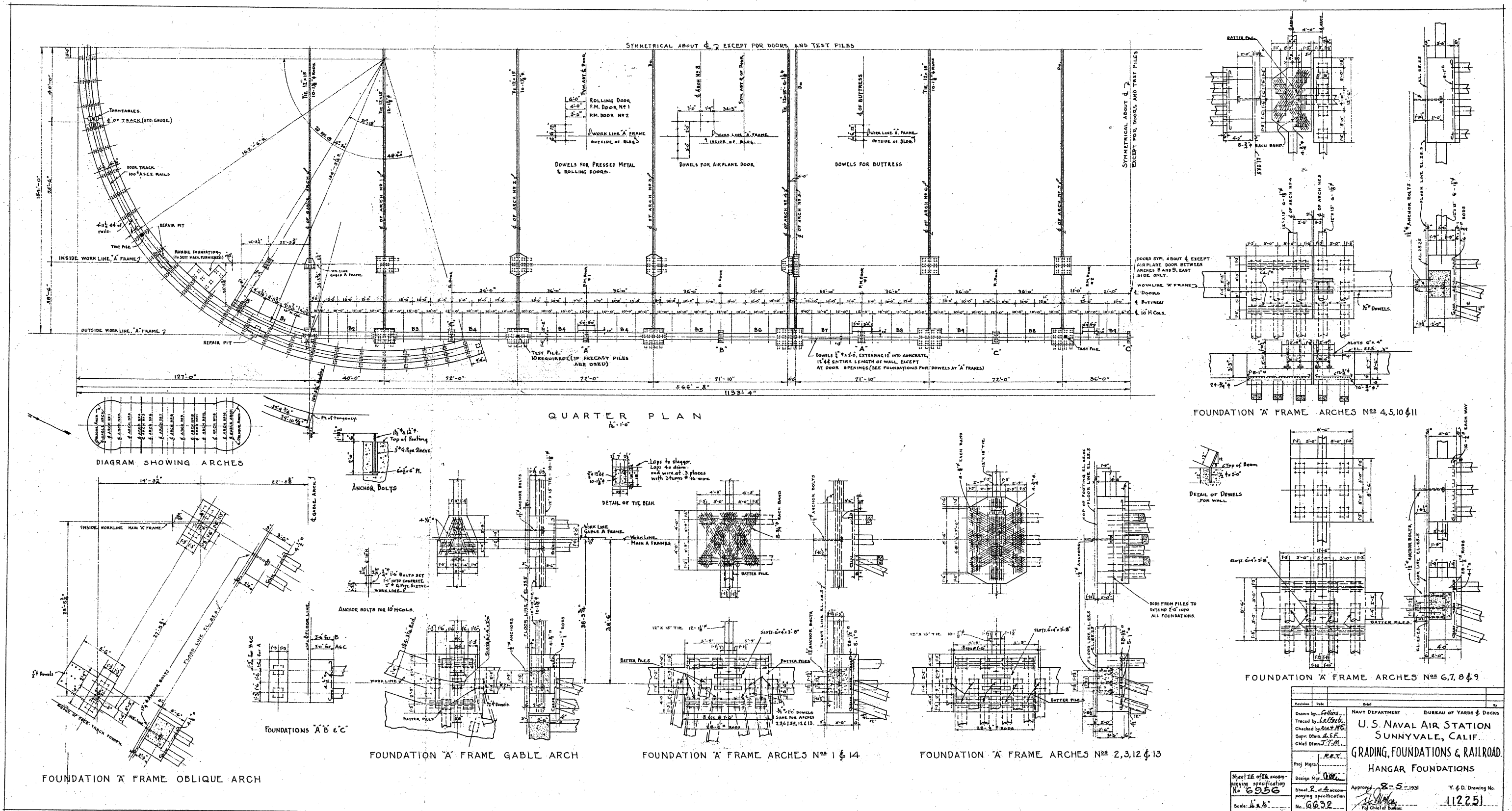
Drawing 9: Grading, Foundation and Railroad, 1931

Drawing 10: Details of Shop Lean To, 1943

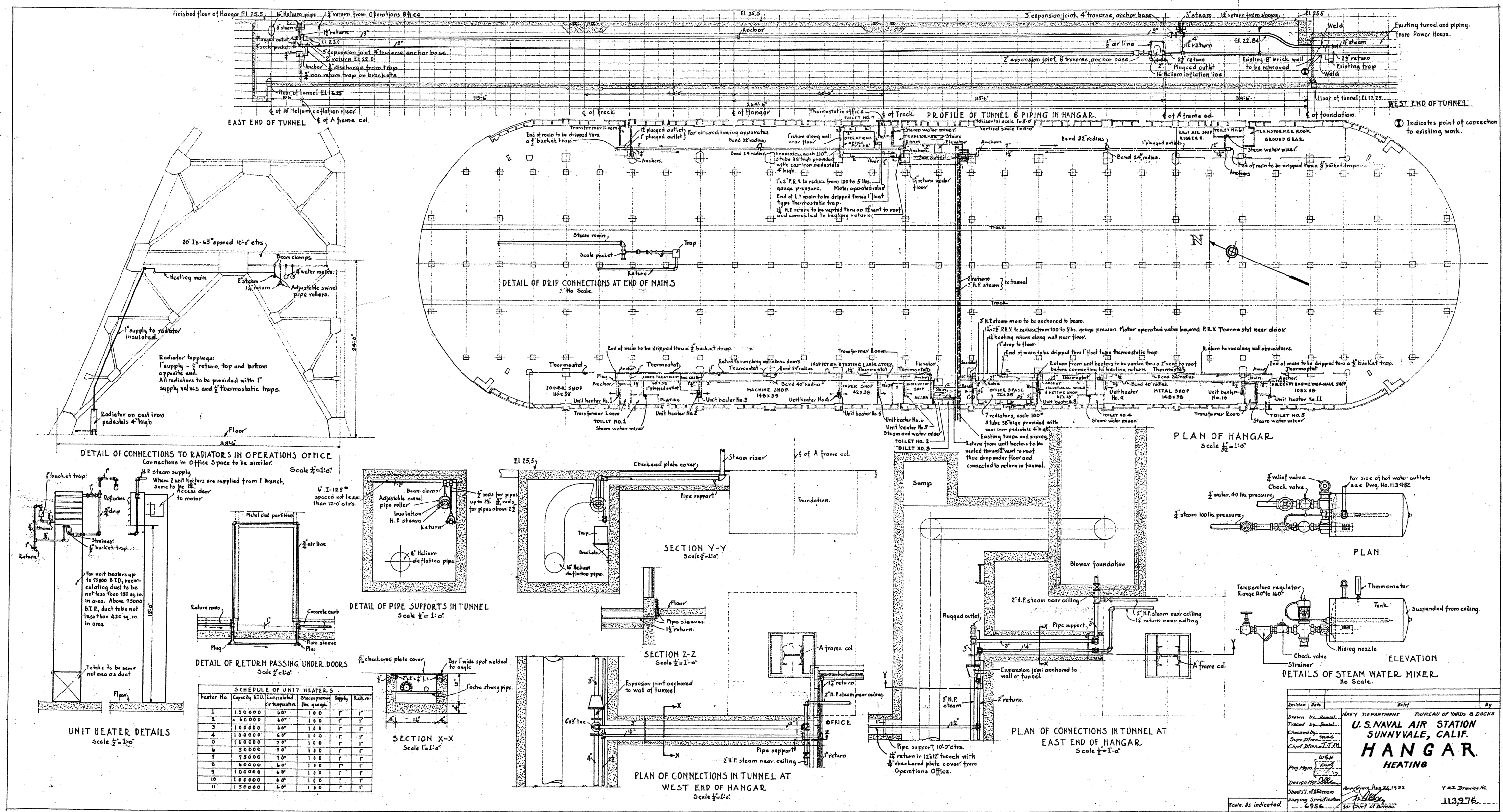


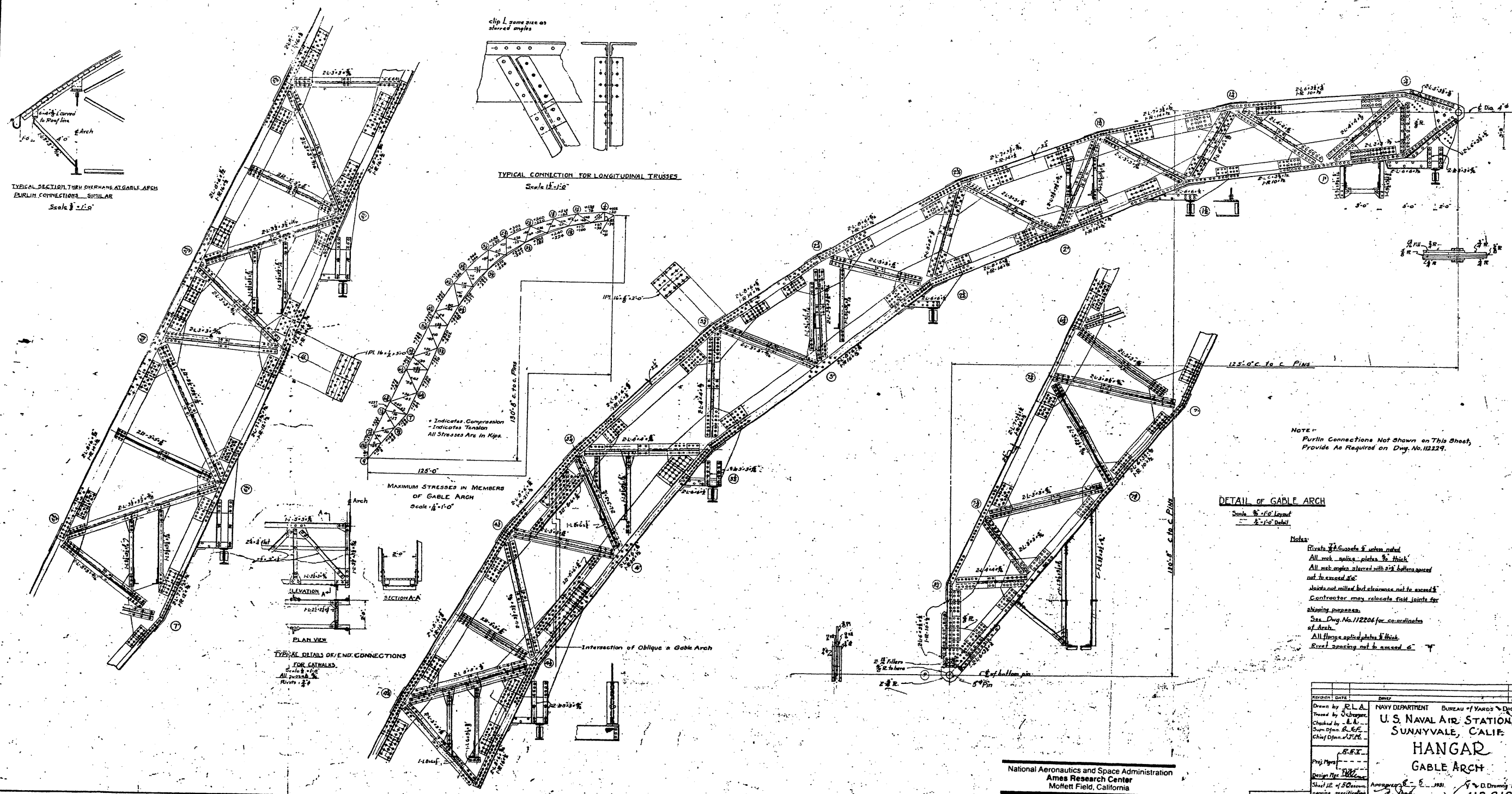


Revision	Date	By
Drawn by H.W. Tipton Traced by H.W. Tipton Checked by J.M. Supv. Drm. J. Morgan Chief Drm. J. X. M.		
Project Mgr. _____ Design Mgr. _____ Supt. S.S. of S.S. _____ No. 6956		
Approved: _____ For Chief of Bureau		Y. & D. Drawing No. 113,983



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National Aeronautics and Space Administration
Ames Research Center
Moffett Field, California

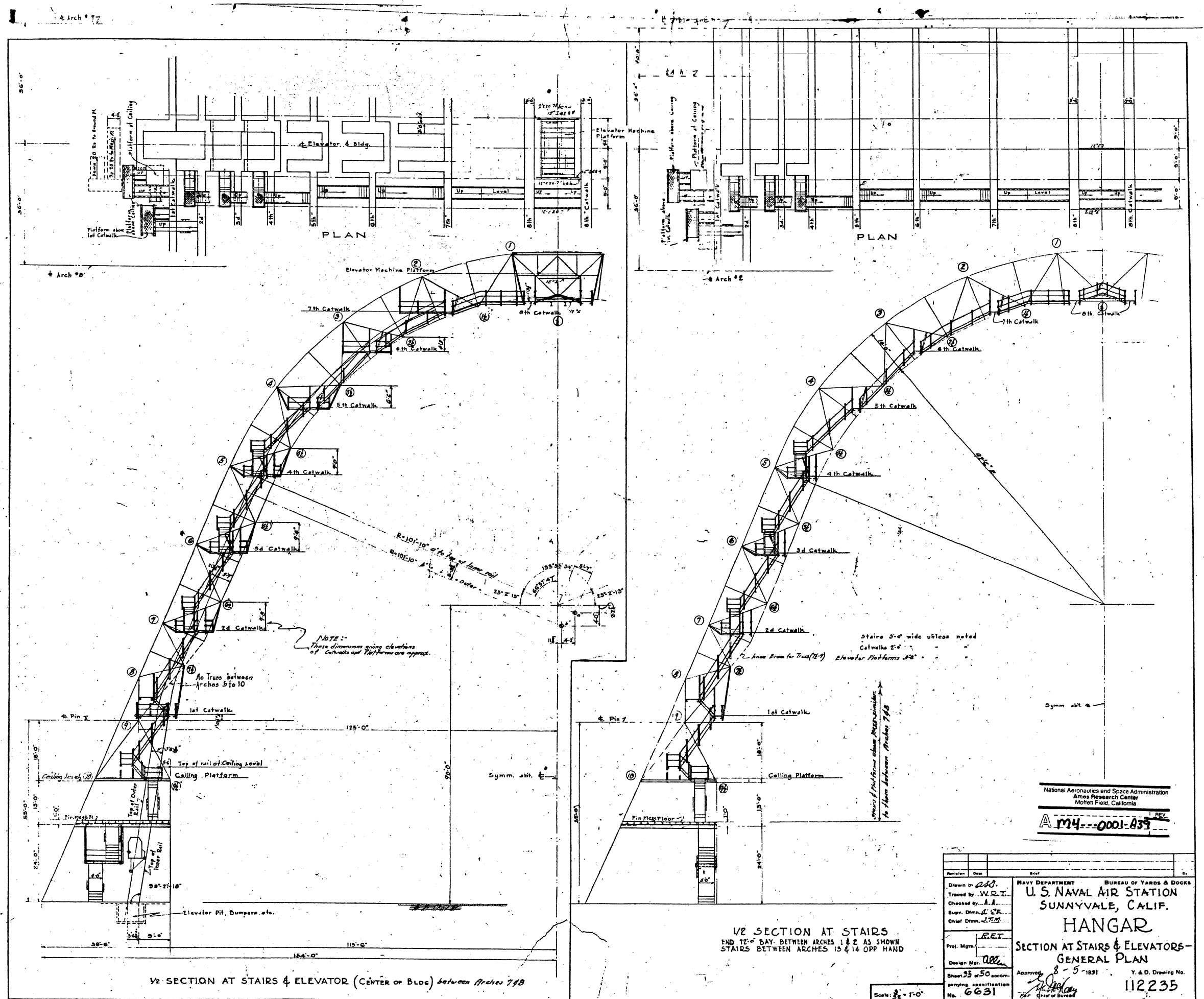
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DESIGNED BY	DATE	DRW	BY
Drawn by R.L.A.			
Traced by J. S. Brown			
Checked by R. L. A.			
Sup. Dwn. R. L. A.			
Chief Dwn. R. L. A.			
Proj. Mgr.			
Design No.			
Sheet 12 of 50			
Parting specification			
No. 0001			

NAVY DEPARTMENT BUREAU OF YARDS & DOCKS
U.S. NAVAL AIR STATION
SUNNYVALE, CALIF.
HANGAR
GABLE ARCH

Approved by: [Signature]
V.D. Drawing No. 112,212



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APPENDIX B

SURVEY PHOTOGRAPHS

SURVEY PHOTOGRAPHS

The following photographs were taken between April and June 2001. These photographs are intended as a supplement to the Survey with the purpose of documenting existing conditions.

1. Hangar One



View from Moffett Field Entry. Hangar One provides the terminus to the formal mall.

2. Hangar One



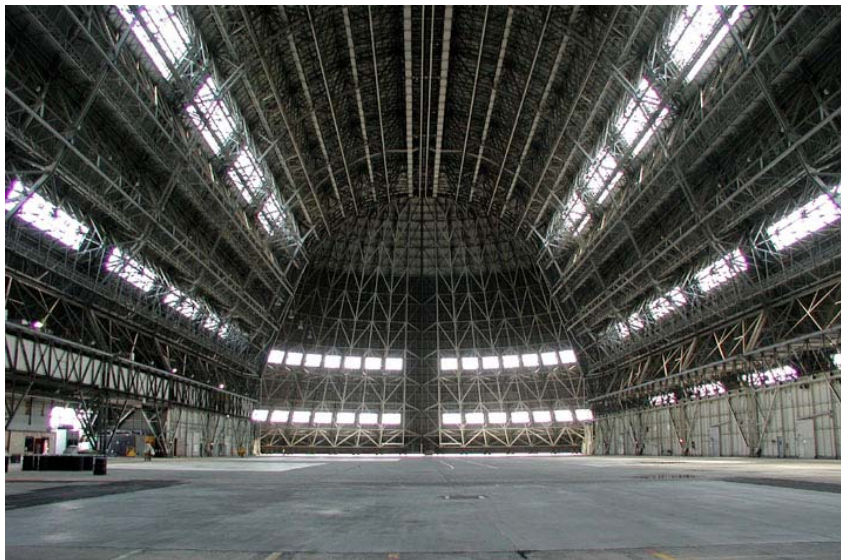
View from the south side of the Hangar. The rows of windows add interest to the skin of the formidable hangar.

3. Exterior Skin



Close-up view of exterior skin.

4. Structure



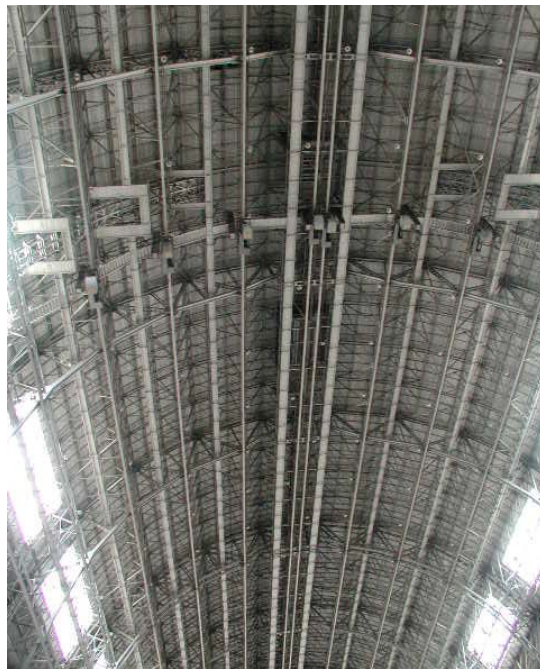
Interior view, South end, showing three-hinged arches and end hangar doors.

5. Structure



Structure at skin.

6. Roof



Underside of Roof and view of crane cabs.

7. Windows



Typical bay of windows. Note the random puncturing for ventilation purposes.

8. Windows



West elevation of Hangar One showing the rows of windows.

9. Windows



East elevation of Hangar. Windows on east and west side are symmetrical.

10. Hangar Door Stops



Southeast doorstop. Photo also shows drainage grate and door tracks.

11. Hangar Doors



Hangar doors are full height. The rhythm of the windows carries through on the doors.

12. Hangar Doors



View of hangar doors, looking up.

13. Hangar Doors



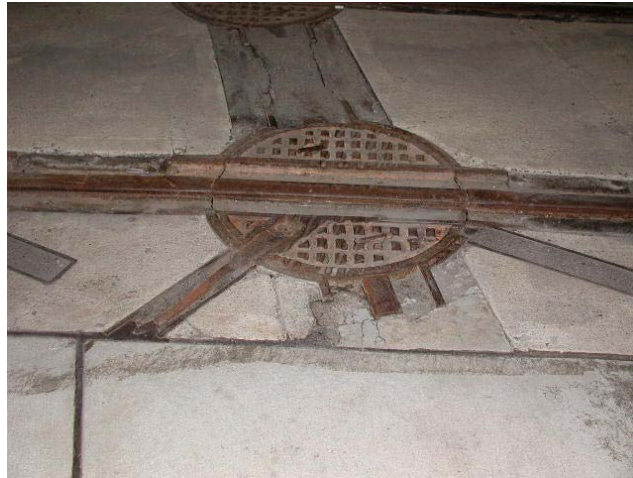
Hangar doors at seam.

14. Hangar Doors



Structure at hangar doors.

15. Hangar Doors



Switch track at Hangar Doors.

16. Overhead Doors



Opening placed within the rhythm of the windows, located on the east side of the hangar, between Column Lines 8 and 9. Doors work well with the aesthetic of the hangar, but the north door is inoperable and requires replacement. It is fixed in the open position. The south door is also inoperable but is in good structural condition and can be repaired.

17. Roll-Up Doors



Typical roll-up door.

18. Doors



Example of a successful door. Located between Column Lines 7 and 8. The door works well with the industrial vocabulary of the hangar. It is within the window framework and has a canopy for weather protection.

19. Doors: Typical Pedestrian Door Examples



Several door types throughout. There is a lack of consistency in design and code complying features.

20. Transformer Room Doors



Typical Transformer Room Door, with 6'-0" head height.

21. New Exit Doors



New exit doors, located on the west side, between column lines 13 and 14. The doors are located just inside a roll-up door. The roll-up door is locked open during events, allowing the new exit doors to exit directly to the exterior.

22. New Exit Doors



New Exit Doors, located on the east side between column lines 11 and 12. Note roll-up door at the exterior skin.

23. Floor



View of original portion of floor. Note the tie-down used for the dirigible.

24. Floor



Tracks at west side of hangar interior. These tracks were used to guide the dirigible inside the hangar. Note the tie-down at the center of the photograph.

25. Floor



Steam tunnel grate at east end termination of tunnel. The tunnel at this location is approximately eight feet deep.

26. Floor



Floor pavement inside hangar above the tunnel.

27. Sheet Steel Paneled Walls



Metal walls, east side. Note the large sliding, metal door and stair stringer at the wall plane.

28. Sheet Steel Paneled Walls



Close-up view of typical metal wall. Exterior view. The metal wall is comprised of sandwich assembly of steel plate and gypsum board. The metal panels are interlocked and riveted to the steel framework.

29. Sheet Steel Paneled Walls



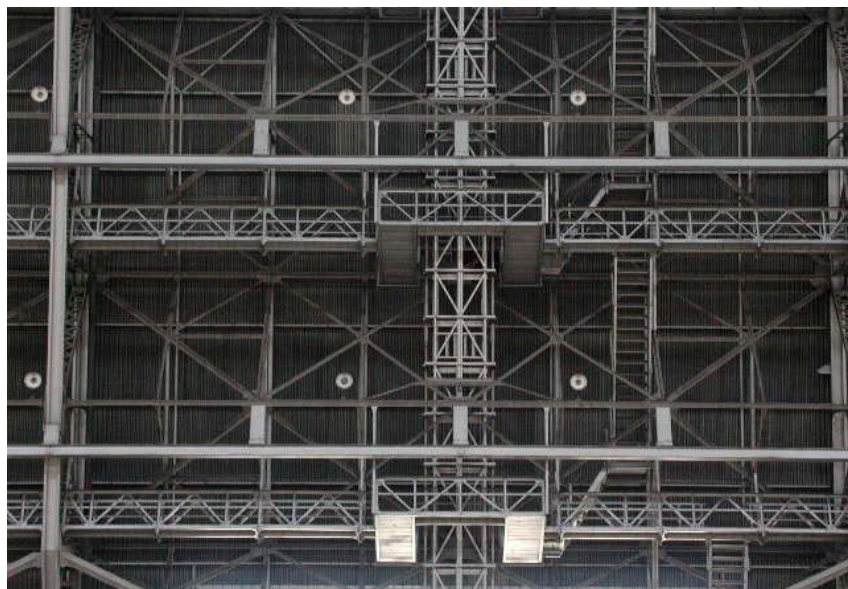
Interior close-up view of typical metal wall.

30. Catwalks



Typical catwalk.

31. Catwalks



View of two levels of catwalks from the main floor.

32. Stairways



Typical stair, at west mezzanine level, leading to catwalks. Note the gate closing access to the catwalks.

33. Elevator



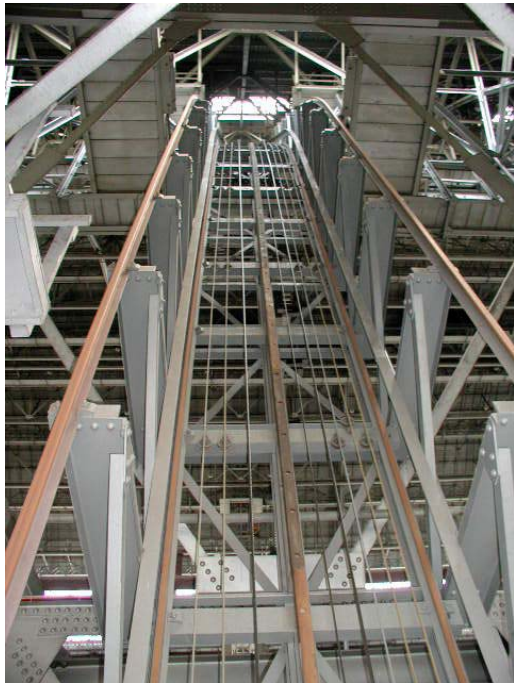
Elevator cab, west side.

34. Elevator



Elevator track, view from main floor, typical both sides.

35. Elevator



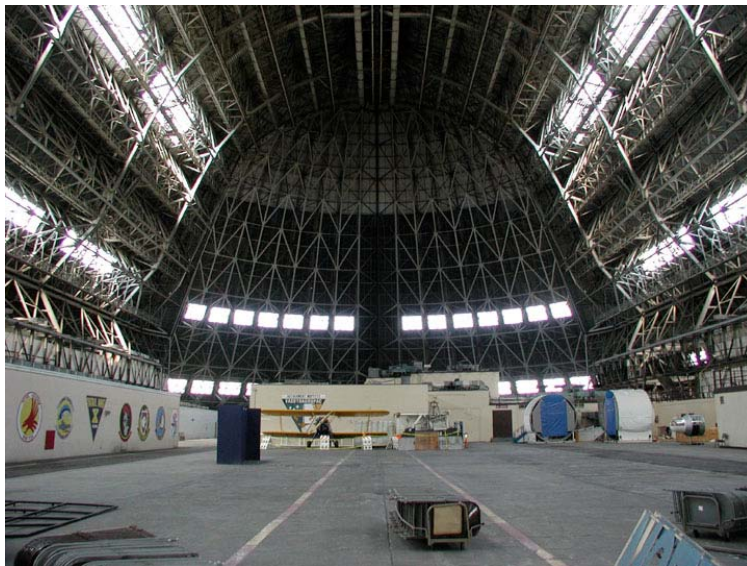
Elevator track, view from mezzanine level. Typical both sides.

36. Post WWII Offices and Classrooms



Post WWII Offices, exterior view, looking south.

37. Post WWII Offices and Classrooms



Post WWII Offices and end doors, looking north.

38. Post WWII Offices and Classrooms



Post WWII Offices, interior view.

39. Cork Room



Cork Room entrance at third floor on the east side.

40. Cork Room



Photograph showing thickness of cork at door jamb.

41. Cork Room Interior



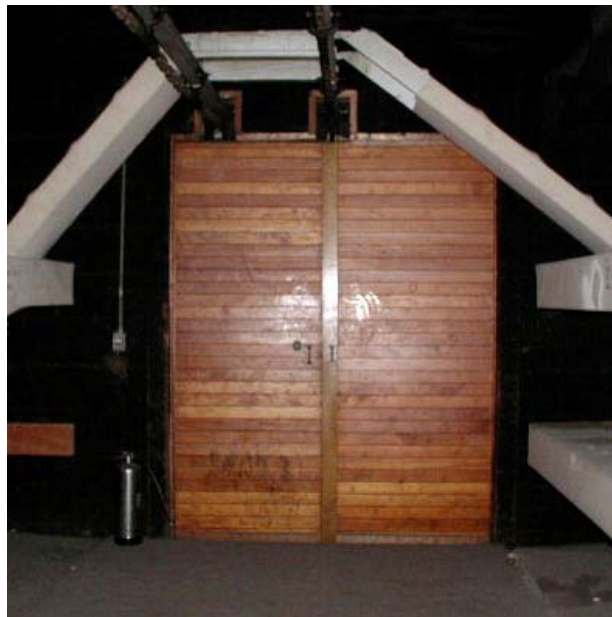
Ceiling Track located at the center of the ceiling. The dirigible balloons were hung on the hooks in order to dry them.

42. Cork Room Interior



Ceiling Track. The light fixture is original.

43. Cork Room Interior



Wood doors at north end of Cork Room. Floor is also wood.

44. Operations Office



Exterior of Operations Office. Bay window is not original.

45. Operations Office



Interior View of the Operations Office. Note clay tile wall.

46. Operations Office



Interior of office showing bay window.

47. Offices and Workshops



Exterior of typical original office space. Perimeter walls are original at First and Second levels. Third floor offices are not original. Interior is heavily altered. Notice how the structure sets a boundary for the perimeter wall.

48. Offices and Workshops



Interior of office corridor, west side. Note the concrete base at original machine shop wall location.

49. Offices & Workshops



Southeast interior office space showing disrepair.

50. Offices and Workshops



Abandoned office, southwest side. Note the missing ceiling tiles and furniture left behind.

51. Offices and Workshops



Original tile floor in second floor office, southwest side. Condition is poor.

52. Offices and Workshops



Exterior Wall of office, second floor east side. Not part of original office space.

53. Toilet Rooms



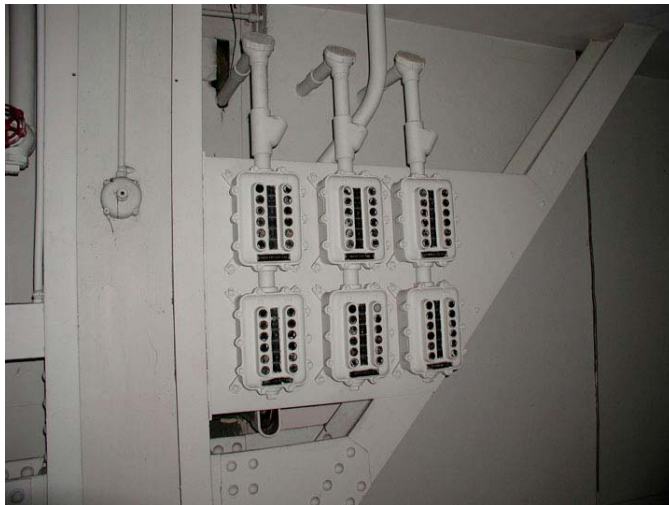
Toilet Room with circular handwashing fountain (probably not original). Sink in background is original, but the urinals are not.

54. Lighting



Original lights at truss (middle of photograph). Lights of later period shown at top and bottom right of photograph.

55. Lighting



Original light switches, operated original ceiling light fixtures.

56. Lighting



Explosion-Proof Light, manufactured by Westinghouse, Style #1082. Fitting is by Crouse-Hinds .

57. Crane Cabs



Crane cabs as seen from the main floor.

58. Cantilevered Cradles



Cradles above third floor office space, as seen from the main floor.

59. Plaques



California Historical Civil Engineering Landmark Plaque

APPENDIX C

CURRENT CONDITION - SURVEY OF IMPORTANT FEATURES

HANGAR

LOCATION	ELEMENT	MATERIAL	CONDITION	SIGNIFICANCE	NOTES & DESCRIPTION
<i>Overall</i>	Exterior Skin	Galbestos siding with metal core, silver paint coating. The galbestos contains asbestos.	Fair	Very Significant	Skin has a rough texture as a result of multiple coats of paint. Patches of rust throughout. Most abuse at 6' and below. Not completely weather proof.
<i>Overall</i>	Structure	Three hinged steel truss. Steel cross bracing, misc. framing and decks. Interior has concrete base, first floor.	Good	Very Significant	Seismic evaluation by Rutherford & Chekene, December 1984, indicated that the structure is in good condition.
<i>Overall</i>	Roof	Built-up with wood decking.	Fair	Significant	Previous surveys indicate that roof has serious leaks. The only safe and permitted access to the roof is through the access door located on the east #8 catwalk between Bents 7 & 8. Access is strictly limited. Roof not accessed for this survey.
<i>Overall</i>	Windows & Skylights	Metal and glass	Fair - Poor	Very Significant	Four rows of metal windows within each bay, set-up in a rhythmic vocabulary. Rust accumulation throughout. Lower windows at west elevation have been painted over. Many windows are broken. From the exterior it appears that windows have been randomly punctured to introduce ventilation to the interior.
<i>Overall</i>	Hangar Door Stops	Concrete & miscellaneous material	Fair	Very Significant	One hangar door stop per door.
<i>North</i>	Hangar Doors	Steel framing, corrugated galbestos siding, and two rows of windows.	Fair	Very Significant	Doors are operable, but not reliable.

LOCATION	ELEMENT	MATERIAL	CONDITION	SIGNIFICANCE	NOTES & DESCRIPTION
<i>South</i>	Hangar Doors	Steel framing, corrugated galbestos siding, and two rows of windows.	Fair	Very Significant	Operable. Doors open at 12 feet per minute.
<i>East Side. Between Column Line 8 & 9</i>	Overhead Doors	Metal and glass	Fair	Contributing	The window framework in this bay makes up the pair of overhead doors. The aesthetic of these doors work well within the context of the hangar. North Door is permanently held open with Columns. A permanent metal fence was installed at this opening for security reasons.
<i>Throughout</i>	Roll-up Doors	Metal	Fair	Contributing	Within the framework of the lower set of windows. Three overhead doors on the east side of the building and five overhead doors on the west side.
<i>Exterior, Throughout</i>	Doors	Metal	Fair	Varies between contributing and non-contributing. Most doors are within original concrete framework, which is significant. This concrete framework is shown most clearly in the top photograph, Appendix B/p. 10.	Doors are industrial style, however, there are several different styles. Bay 7-8 East side has an example of a successful door. The door is within the window framework as well as within the original, typical concrete framework designed for the doors. This is the only door that has a canopy for weather protection. The canopy is of the industrial aesthetic and fits very well within the structural framework.
<i>Throughout</i>	Transformer Room Doors	Metal	Fair	Significant	Total of six doors. Approx. 5'-6". Louvered at the lower half, three vision panels at the top. These doors are original but do not have the required height for an exit door. These doors provide single access to the transformer rooms from the exterior only.

LOCATION	ELEMENT	MATERIAL	CONDITION	SIGNIFICANCE	NOTES & DESCRIPTION
<i>South Half</i>	New Exit Doors	Wood	Good	Not Contributing	Placed in newly created 1-hr corridors. Aligned with roll-up doors. Not visible from the exterior when the roll-up doors are closed.
<i>Overall</i>	Floor	Concrete	Fair	Contributing	Some of the original floor remains. However, a significant portion of the floor has been altered. This is due to the addition of offices space that has been built out in the high bay area as well as repair work to make the floor even. The floor at the northern end contains lead dust. The rails, tie-downs for the dirigible, and cross-over track make up part of the floor of the hangar. These are significant.
<i>Longitudinal Midpoint of Hangar</i>	Tunnels Utility Tunnel	Concrete	Not known	Contributing	5'-6" wide by 7'-2" high with 8" thick concrete walls. The tunnels were not accessed for this survey. The tunnels connect the hangar to the boiler room, Bldg. Ten.
<i>Overall</i>	Drainage Grate	Metal	Fair	Contributing	Interior condition not known.
<i>Interior</i>	Sheet Steel Paneled Walls	Sheet Steel & Gypsum Board	Good	Very Significant	Metal walls are panels that are made up of a composite: gypsum board sandwiched between two metal panels. The panels interlock like a puzzle, hence allowing quick assembly. The pieces are bolted together. There are several metal slider doors within these metal walls. The slider doors are significant.
<i>Interior</i>	Catwalks	Steel	Good	Very Significant	Closed off from most public access due to nonconformance to code. There are 8 catwalks on the east side of the hangar and 8 catwalks on the west side of the hangar. The lowest catwalks on either side are suspended, while the others are supported from underneath.

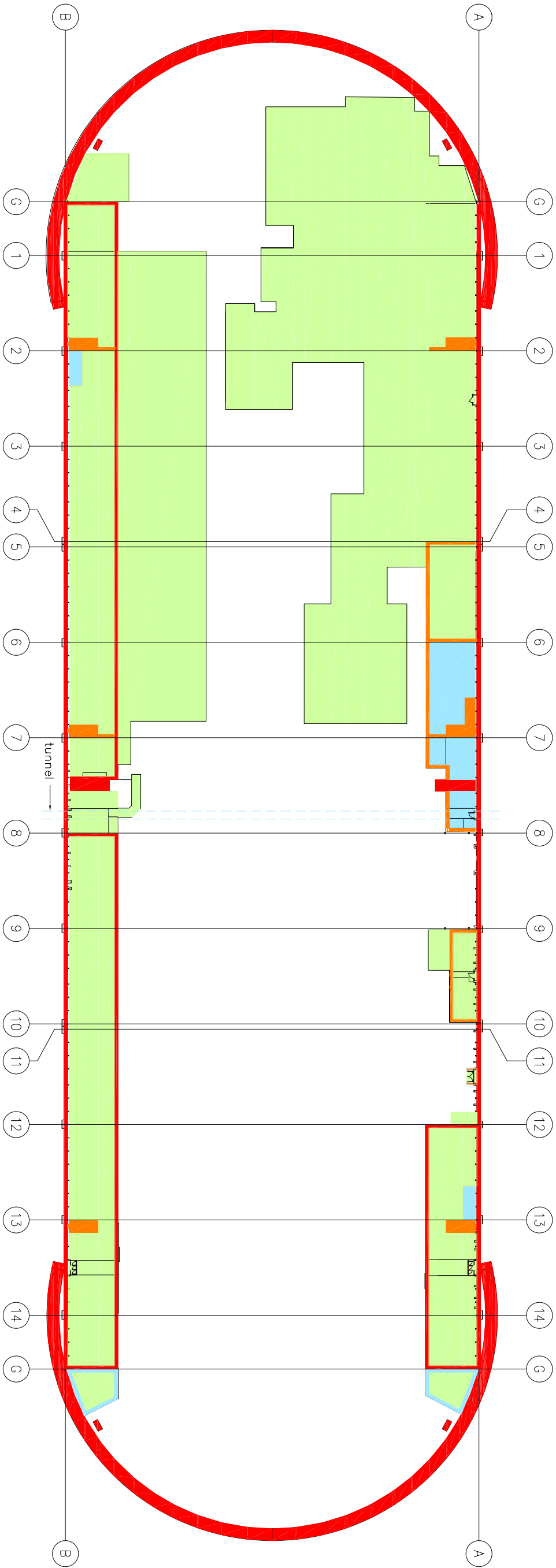
LOCATION	ELEMENT	MATERIAL	CONDITION	SIGNIFICANCE	NOTES & DESCRIPTION
<i>Interior</i>	Stairways	Steel	Good	Significant, most locations	There are 3 sets of access stairways to the catwalks and the roof on each side of the hangar.
<i>West. Between Column Lines 7 & 8</i>	Elevator	Metal	Fair	Very Significant	Located at the longitudinal mid-point of the structure. Runs up along the arched structure.
<i>East, Between Column Lines 7 & 8</i>	Elevator	Metal	Missing	Very Significant	Only shaft and tracks remain. Tracks and shaft similar to west side.
<i>Below Roof Deck</i>	Break Room			Significant/Contributing	Possibly added after original construction. The only safe and permitted access to the roof is through the access door located on the east #8 catwalk between Bents 7 & 8. Access is strictly limited. Not accessed for this survey.
<i>High Bay, Open area</i>	Post WWII Offices and Classrooms	Misc. Type V building materials, asbestos containing materials	Fair	Non-Contributing	Added as classrooms and offices. No inherent historical value.
<i>Third Floor, East Side. Between Column Line s1 & 3</i>	Cork Room	Walls have plaster composition on the exterior and cork on the interior, Oak Floors	Fair	Very Significant	Used to cure the dirigible gas bags and cells. Cork on wall is about 6" thick.
<i>First & Second Floor, North-East side, Between Column Lines 5 & 7</i>	Operations Office	Perimeter wall is hollow, clay tile and sheet steel panels. Interior walls are wood & gypsum board.	Fair	Significant/Contributing	Perimeter Walls are original and significant. Interior space altered. Bay window added after original construction.

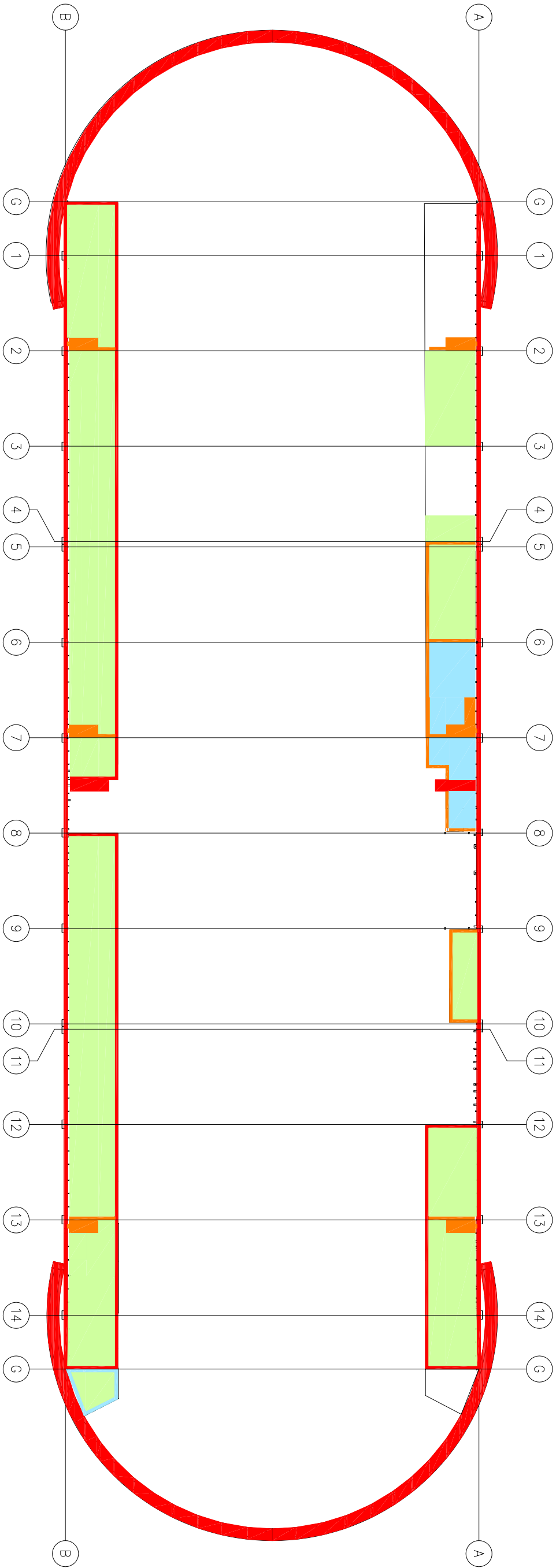
LOCATION	ELEMENT	MATERIAL	CONDITION	SIGNIFICANCE	NOTES & DESCRIPTION
<i>First & Second Floor, South-East side, Between Column Lines 12 & G</i>	Office Space	Perimeter wall is sheet steel panels. Interior walls are wood & gypsum board.	Poor	Significant/non-contributing	Perimeter walls are significant. Interior space is heavily altered space.
<i>1st Floor, Throughout</i>	Work Shops	Perimeter wall is sheet steel panels. Interior walls are wood & gypsum board	Fair	Perimeter wall is significant. Interior space is noncontributing.	Interior space is heavily altered.
<i>2nd Floor, Throughout</i>	Office Space	Perimeter wall is sheet steel panels. Interior walls are wood & gypsum board	Fair	Perimeter wall is significant. Interior space is non-contributing.	Interior space is heavily altered.
<i>2nd Floor, West, Between Column Lines 13-14</i>	Office	Walls are wood & gypsum board, tile floor.	Poor	Non-contributing	Small, original office space.
<i>Throughout</i>	Transformer Rooms	Concrete Walls	Unknown	Significant	Part of original structure.
<i>West Side, between Column lines 1 & 3</i>	Toilet Room #1	Concrete Walls	Fair - Poor	Contributing	Some original fixtures.
<i>East Side, between Column lines 12 & 14</i>	Toilet Room #6	Concrete Walls	Fair - Poor	Contributing	Some original fixtures.
<i>Original @ ceiling</i>	Lighting	Metal fixture with glass lens.	Fair	Contributing	The lights are not operable. Light switches associated with these lights are contributing as well.

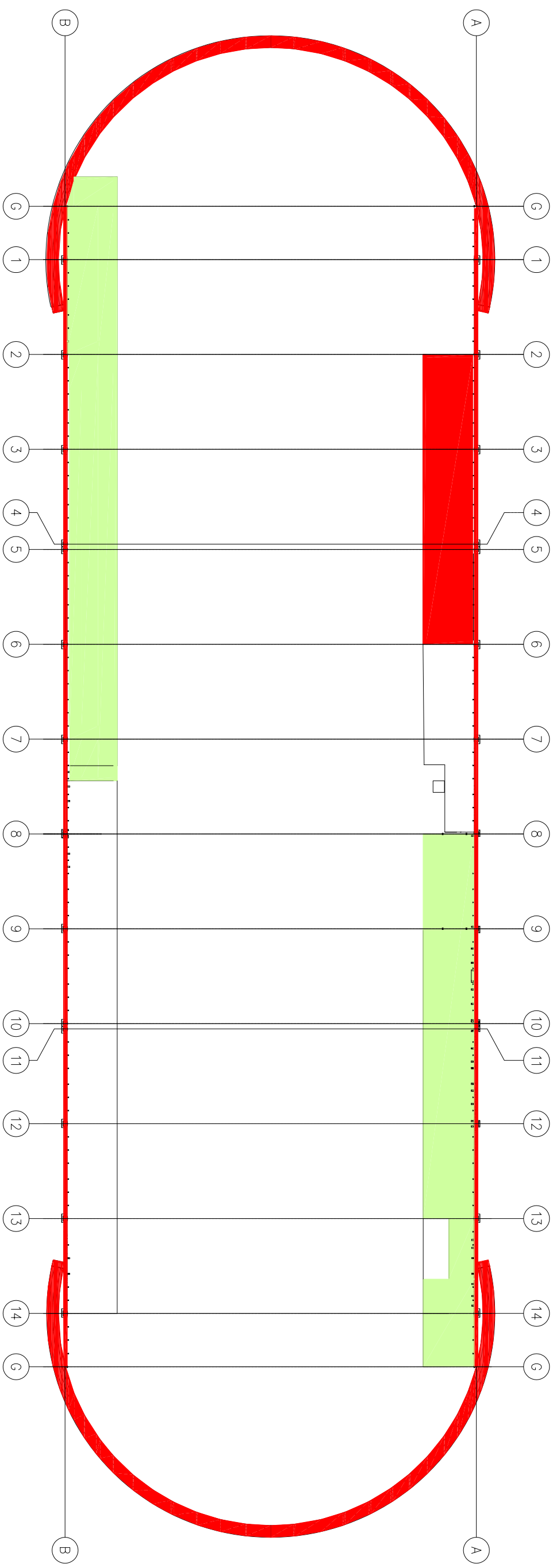
LOCATION	ELEMENT	MATERIAL	CONDITION	SIGNIFICANCE	NOTES & DESCRIPTION
<i>South Bay</i>	PWWII Lighting	Metal fixture with open bulb.	Good	Non-Contributing	Added to the southern half of the hangar for aircraft operations.
<i>Throughout</i>	Explosion-Proof Lights	Metal and Glass	Good	Very Significant	Attached to the steel structure of the hangar. Some are operable.
<i>Throughout</i>	Crane Cabs	Metal with wood seats.	Unknown	Very Significant	
<i>North End of Hangar</i>	Cantilevered Cradles	Wood	Fair	Very Significant	
<i>East Exterior of Hangar</i>	Plaques	Metal	Good	Non-Contributing	California Historical Civil Engineering Landmark Plaque & Memorial Plaque. While these are not significant, they point to the historical significance of the hangar.

APPENDIX D

DIAGRAMS: HISTORICAL SIGNIFICANCE BY LEVEL





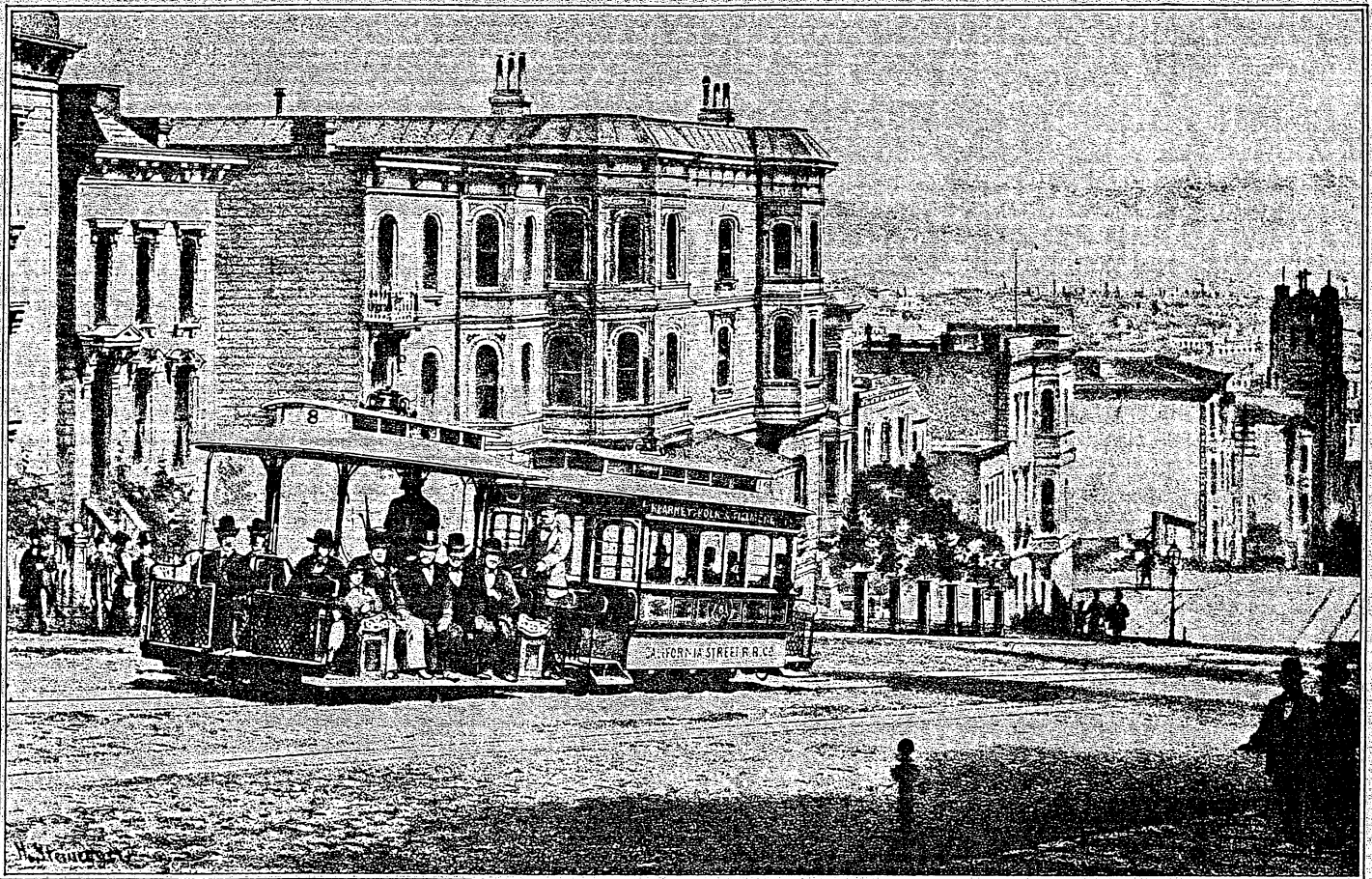


APPENDIX E

PRIOR EVALUATIONS OR NOMINATIONS

HISTORIC CIVIL ENGINEERING LANDMARKS

OF SAN FRANCISCO AND NORTHERN CALIFORNIA



CALIFORNIA STREET WIRE ROPE RAIL ROAD.
STEEPEST GRADE 18 FEET IN 100 FEET.

125th Anniversary
American Society of Civil Engineers
Annual Convention
San Francisco Section, Sponsor

OCTOBER 1977

Moffett Field Airship Hangar No. 1 (1933)

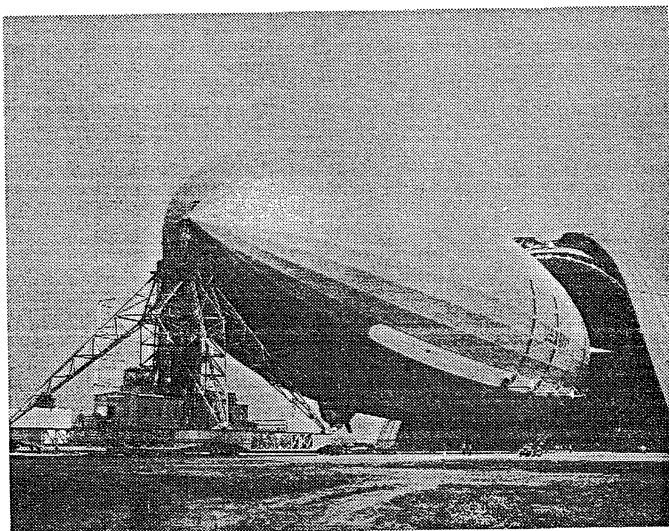
Dedicated as a California Historic Civil Engineering Landmark by the San Francisco Section, ASCE



A unique feature of America's defense program in the late 1920's and early 1930's was the experimentation with lighter-than-air craft. Patterned after the famous German zeppelins of World War I, it was hoped these huge but graceful dirigibles would become battle-ships of the air, floating high above the reach of guns or airplanes. Unfortunately, America's proud airships were plagued by disaster: the **Los Angeles** (LZ 126), provided as war reparations by the German Zeppelin Company in 1924, and the American-built ships **Shenandoah**, **Akron** and **Macon** all met violent ends, although, being helium-filled, none of the American ships died as spectacularly as the hydrogen-filled **Hindenberg**.

In support of the dirigible program, a chain of airship mooring and docking stations were constructed on the East Coast (**Lakehurst**), in the Midwest (**Akron**) and on the Pacific Coast. The West Coast facility, originally designated the **Sunnyvale Naval Air Station**, contained a unique feature: a gigantic airship dock (hangar) only a few feet smaller in size than the world's largest hangar at **Akron**. The design and erection of this hangar was to provide a unique test of civil engineering skill, as the profession responded to the challenge to create a structure of huge proportions and unusual configuration.

Hangar One was built to house the gigantic airship USS Macon.

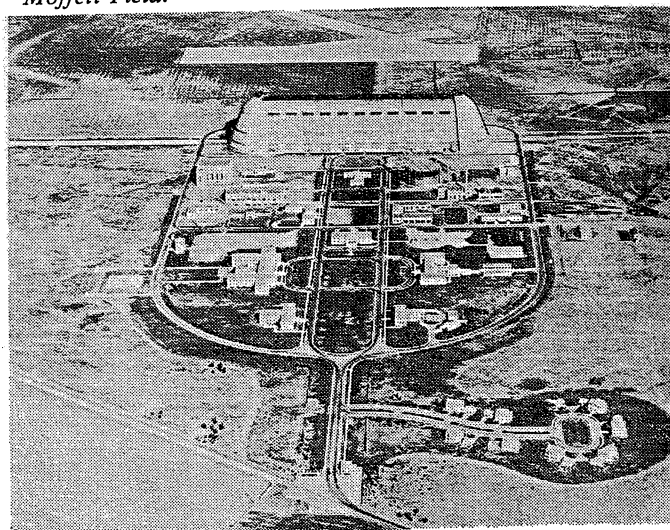


Construction of the \$1.1 million hangar began in October 1931. Although intended to house the **USS Macon**, an airship of 6.5 million cubic feet,* the hangar's eight acres of clear floor space was designed ultimately to house airships of nearly twice that volume. The inverted "U"-shaped structure, 1,133 feet long, 308 feet wide and 194 feet high, quickly dominated the landscape.

The construction of the steel framework was ingeniously done, using a huge timber traveler mounted on eight 50-ton railroad flatcars running on three parallel railroad tracks. Weighing 500 tons, standing 194 feet high and mounting three stiff-leg derricks, the traveler enabled the installation of a complete 72-foot-long bay assembly, consisting of arch truss, bracing, roof members and catwalks, totaling some 350 tons of steel, in as little as three and one-half days. This use of a traveler represented a distinct departure from methods used in the erection of previous airship docks.

The air station, with its huge airship hangar, landing field for airplanes, and administrative buildings, was commissioned on April 12, 1933. A scant month later, the facility's name was changed to **Moffett Field** to honor the Chief of Naval Aeronautics who was killed in the crash of the airship **Akron**.

Early aerial view shows original layout of airship facilities at Moffett Field.



*Dimensions of the **USS Macon**, the largest airship built for the US dirigible program, were: 785 feet long, 136 feet maximum diameter, 6.5 million cubic feet of volume, 70-man complement. Launched in 1933, the **Macon** crashed and was destroyed in 1935.

Two years later, in 1935, the tragic loss of the **Macon**, Moffett Field's "own" airship, put an end to the Navy's airship program. During World War II, the vast hangar, now known as "Hangar Number One," was used to house the blimps (nonrigid airships) and observation balloons that played an important part in coastal anti-submarine work. The hangar remains in use today as an airplane repair and storage facility, an ironic use of the greatest surviving monument to a brief, tragic but colorful chapter in man's exploration of the air.

TECHNICAL DATA

Location	Sunnyvale, California
Dates	First contract let: October 1, 1931 Commissioned: April 12, 1933 Name changed to Moffett Field: May 18, 1933
Cost	Hangar: \$1.1 million Total facility: \$5 million
Engineers	Rear Admiral A.L. Parsons (CEC) USN, Chief of the Bureau of Docks and Yards, designer; Lieut. Cdr. E.L. Marshall (CEC) USN, officer-in-charge of construction. J.H. Pomeroy personally designed and supervised the operation of the timber traveler.

Dimensions

(Hangar No. One)
Length: 1,133 feet
Width: 308 feet
Height (overall): 194 feet
Height (interior clear space):
180 feet

SPECIAL NOTES

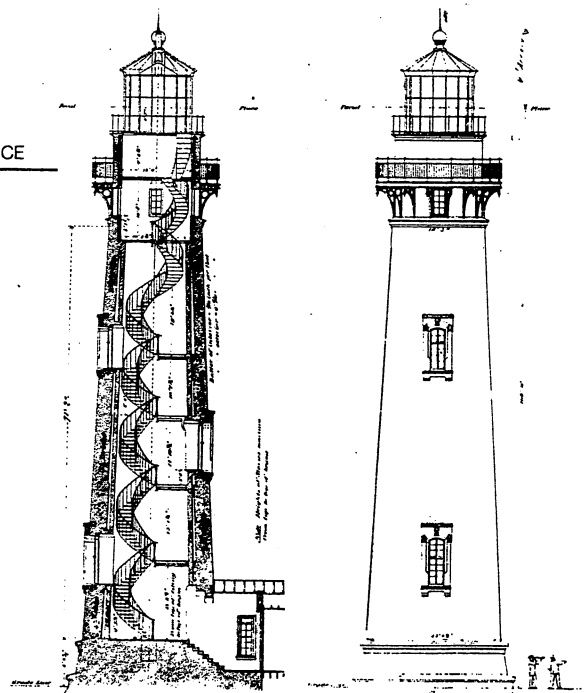
1. The hangar frame consists of a series of equal-depth arch trusses on 72-foot centers. There are eleven of these 72-foot centers. The trusses are made up of three-hinged arches resting on rigid A-frames 55 feet high. Temperature expansion is provided for by use of two transverse expansion joints that divide the structure into three units, with the end doors anchored to reduce end thrust on the door framing and opening mechanisms. The upper 70 feet of hangar cover consists of two-inch redwood sheathing and built-up asphalt felt roofing, with the rest of the sides covered with asbestos-protected metal sheets and V-beam sheathing.
2. At each end of the structure there are huge doorways made of two spherical orange-peel leaves that provide almost unobstructed openings. Each door leaf weighs 550 tons and operates on a circular rail track.

Pigeon Point Lighthouse (1872)

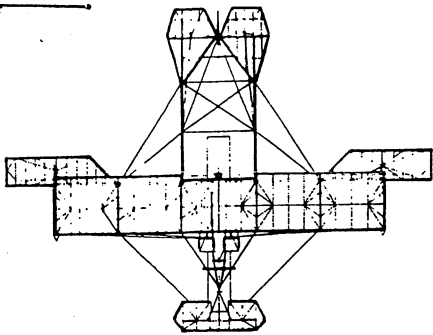
Dedicated as a California Historic Civil Engineering Landmark by the San Francisco Section, ASCE

On the foggy night of Monday, June 6, 1853, the clipper ship **Carrier Pigeon**, 130 days out of Boston with a cargo of general merchandise destined for California's gold fields, drifted aground on a headland then known as Whale Point, about 30 miles north of Santa Cruz. Although the ship itself was a total loss, Captain Doane and his crew labored to save what they could of the cargo, and there ensued a drama typical of the pioneering days of coastwise shipping in California.

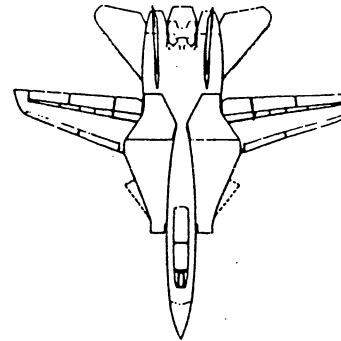
As soon as the wreck was known in San Francisco, the coastal steamship (actually a sailing ship with auxiliary steam engines) **Sea Bird** was dispatched to the wrecked **Carrier Pigeon** with instructions to attempt salvage. Later the same day, the **USS Active**, enroute to the Farallon Islands with material for the lighthouse under construction there, put in near Whale Point and



The original drawings of the Pigeon Point Lighthouse reveal both sturdiness and a graceful beauty.



Office of the Chief of Naval Operations
Naval Aviation History
Washington Navy Yard
Building 146
Washington, D. C. 20374



OP-05D2
2 November 1981

Mr. John Shackleton
Public Affairs Office
NAS
Moffett Field, CA 94035


Dear Mr. Shackleton:

Mr. Van Vleet has asked me to respond to your recent telephone request for a copy of the CNO letter which approved Hangar #1 at NAS Moffett Field as an historic site.

I have enclosed a copy of that letter and its endorsements, obtained through the courtesy of Mr. H. Vadnais of the Navy Memorial Museum. The original letter was in poor reading condition so Mr. Vadnais had it retyped. That copy is also included.

If you have further questions concerning naval aviation, please feel free to contact this office.

Sincerely,


(Mrs) Gwendolyn J. Rich
Archivist

Enclosures

Copy to:

Op-09B99/jsc
Ser: 7804P09B9
3 January 1966

From: Chief of Naval Operations (Op-09B9)
To: Commandant, Twelfth Naval District/Commander, U.S. Naval
Base, San Francisco

Subj: U.S. Navy Historic Site Markers for Buildings, Structures,
Sites and Monuments in the Twelfth Naval District

Ref: (a) COMTWELVE/COMNAVBASE SFRAN ltr ND12-44A-2 of 22 Dec 1965
(b) CO, NAS Moffett Field ltr SI:gn of 8 Dec 1965

1. The recommendation in reference (a) to designate Hangar #1,
Naval Air Station, Moffett Field as a "U.S. Navy Historic Site"
is approved.

2. The proposed inscription cited in reference (b) is satisfactory,
but it is suggested that the significance as succinctly noted in the
wording of paragraph 3 of reference (b) be included in the
inscription.

/s/ E. M. ELLER
By direction

Copy to:
BUWEPS
BUDOCKS
CINCPACFLT
COMNAVAIRPAC
COMFAIRWINGSPAC
CO NAS MOFFETTFIELD

AND
COMMANDER, U. S. NAVAL BASE, SAN FRANCISCO
FEDERAL OFFICE BUILDING
50 FULTON STREET
SAN FRANCISCO, CALIFORNIA 94102

IN REPLY REFER TO:
ND12-44A-2

6

From: Commandant, Twelfth Naval District/Commander, U.S. Naval Base,
San Francisco
To: Chief of Naval Operations (OP-09B9)
Subj: U.S. Navy Historic Site Markers for Buildings, Structures,
Sites and Monuments in the Twelfth Naval District
Ref: (a) OPNAVINST 5750.11 (NOTAL)

Encl: (1) CO NAS MOFFETT ltr SI:gn of 8 December 1965

1. In accordance with reference (a), the Commandant, Twelfth Naval District has reviewed the recommendation of the Commanding Officer, Naval Air Station, Moffett Field, enclosure (1), for designation of Hangar 1 as a "U.S. Navy Historic Site," and concurs that the structure is of historic significance.

2. It is recommended that Hangar 1 be considered favorably for designation as a "U.S. Navy Historic Site" with inscription as proposed in enclosure (1).

John E. Frank
JEF

Copy to:
CO NAS MOFFETTFIELD
COMFAIRWINGSPAC (w/encl 1)
BUWEPs (w/encl 1)
COMNAVAIRPAC (w/encl 1)
CINCPACFLT (w/encl 1)

Copy to:
COMTWELVE/COMNAVBASE SFRAN (Code OOB)

Copy to:
COMPTETIVE/COMNAVBASE SFRAN (Code 00B)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICEFinal
from NPSNATIONAL REGISTER OF HISTORIC PLACES
EVALUATION/RETURN SHEET

REQUESTED ACTION: NOMINATION

PROPERTY US Naval Air Station Sunnyvale, California, Historic District
NAME: tMULTIPLE
NAME:

STATE & COUNTY: CALIFORNIA, Santa Clara

DATE RECEIVED: 1/13/94 DATE OF PENDING LIST: 1/26/94
DATE OF 16TH DAY: 2/11/94 DATE OF 45TH DAY: 2/27/94
DATE OF WEEKLY LIST:

REFERENCE NUMBER: 94000045

NOMINATOR: FEDERAL NPS

REASONS FOR REVIEW:

APPEAL: N DATA PROBLEM: N LANDSCAPE: N LESS THAN 50 YEARS: N
OTHER: Y PDIL: N PERIOD: N PROGRAM UNAPPROVED: N
REQUEST: N SAMPLE: N SLR DRAFT: Y NATIONAL: Y

COMMENT WAIVER: N

☒ ACCEPT ☐ RETURN ☐ REJECT 2/24/94 DATE

ABSTRACT/SUMMARY COMMENTS:

The U.S. Naval Air Station Sunnyvale, California Historic District is eligible under NR criteria A and C in the areas of Military History, Architecture, and Engineering. The discontinuous district represents a rather unique and significant episode in the development of U.S. naval aviation prior to World War II. The Sunnyvale base was one of two Naval Air Stations built to port lighter-than-air dirigibles during the 1930s. Dirigible Hangar #1, the later blimp hangars #2 and #3, and their accompanying support buildings all represent excellent examples of early twentieth-century military planning, engineering, and construction.

The three enormous airship hangars represent significant engineering accomplishments and they are among a limited number of extant historic airship facilities in the United States. The core of the historic Naval Air Station--centered on a landscaped "common" and dominated by the looming airship hangars--remains largely intact and includes fine regional examples of Spanish Colonial Revival design.

RECOM./CRITERIA Accept A+C
REVIEWER Paul R. Lusignea
DISCIPLINE Historian
DATE 2/24/94DOCUMENTATION see attached comments Y/N see attached SLR Y/N

Form 10-900-a

OMB Approval No. 1024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number _____ Page _____

SUPPLEMENTARY LISTING RECORD

NRIS Reference Number: 94000045

Date Listed: 2/24/94

US Naval Air Station Sunnyvale,
California Historic District
Property Name

Santa Clara
County

CA
State

N/A
Multiple Name

This property is listed in the National Register of Historic Places in accordance with the attached nomination documentation subject to the following exceptions, exclusions, or amendments, notwithstanding the National Park Service certification included in the nomination documentation.

Paul R. Ferguson
Signature of the Keeper

2.24.94
Date of Action

=====

Amended Items in Nomination:

Classification:

The number of previously listed resources is changed to zero (0); Hangar #1 was only determined eligible for listing.

Significance:**Area of Significance:**

Architecture is added as an area of significance, defining the district as a good regional example of military design in the Spanish Colonial Revival style.

Significant Person:

The name of Adm. William Adger Moffett is removed from the significant person blank since the district was not nominated under Criterion B.

continued

PS Form 10-900-a
(-88)

OMB Approval No. 1024-0018

United States Department of the Interior
National Park ServiceNational Register of Historic Places
Continuation Sheet

Section number _____ Page _____

SUPPLEMENTARY LISTING RECORD

NRIS Reference Number: 94000045

Date Listed: 2/24/94

US Naval Air Station Sunnyvale,
California Historic District
Property NameSanta Clara
CountyCA
StateN/A
Multiple Name

=====

Amended Items in Nomination:

continued

U.T.M.:

The UTM coordinates are corrected to read:

A	10	582960	4140460
B	10	583240	4140880
C	10	583800	4141120
D	10	583940	4140740
E	10	583140	4140330
AA	10	584640	4141420
BB	10	584880	4141520
CC	10	584760	4141120
DD	10	584990	4141220

This information was confirmed with Navy FPO J. Bernard Murphy.

DISTRIBUTION:

National Register property file
Nominating Authority (without nomination attachment)

RECEIVED

OMB No. 1024-0018

NPS Form 10-900
(Rev. 8-99)United States Department of the Interior
National Park Service

JAN 13 1994

RECEIVED

NATIONAL
REGISTER

JUL 15 1993

OHP

National Register of Historic Places
Registration Form

This form is for use in nominating or requesting determinations of eligibility for individual properties or districts. See instructions in *Guidelines for Completing National Register Forms* (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property

historic name United States Naval Air Station Sunnyvale, California- Historic District
other names/site number U. S. Naval Air Station Moffett Field - Central Historic District

2. Location

street & number Central District ☐ not for publication
city, town Naval Air Station Moffett Field ☐ vicinity
state California code CA county Santa Clara code CA 085 zip code 94035

3. Classification

Ownership of Property

- ☐ private
☐ public-local
☐ public-State
☒ public-Federal

Category of Property

- ☐ building(s)
☒ district
☐ site
☐ structure
☐ object

Number of Resources within Property

Contributing

40

1

2

43

Noncontributing

54 buildings

sites

structures

objects

54 Total

Name of related multiple property listing:

Number of contributing resources previously
listed in the National Register 1

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this
☒ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the
National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.
In my opinion, the property ☒ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

Signature of certifying official

Date

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

Signature of commenting or other official

Date

State or Federal agency and bureau

5. National Park Service Certification

I, hereby, certify that this property is:

- ☒ entered in the National Register.
☐ See continuation sheet.
☐ determined eligible for the National
Register. ☐ See continuation sheet.
☐ determined not eligible for the
National Register.

☐ removed from the National Register.☐ other, (explain):

Function or Use	
Historic Functions (enter categories from instructions)	Current Functions (enter categories from instructions)
Defense Naval Facility	Defense Naval Facility
Air Facility	Air Facility
Description	
Architectural Classification (enter categories from instructions)	Materials (enter categories from instructions)
Late 19th and 20th Century Revivals	foundation concrete
Mission/Spanish Colonial Revival	walls stucco
Other: Dirigible Hangar	roof clay tile
WW II Blimp Hangar (2)	other terra cotta panels

Describe present and historic physical appearance.

SITE DEFINITION

The site consists of a large number of buildings that were constructed over an approximately 60 year time frame from the early 1930's until today. The buildings are clustered in a formal campus-like layout that is defined by a western-facing gated entrance and a very well tended landscape which includes mature specimen trees, shrubs, and manicured lawns.

The site can be easily divided into its stylistic components that also define the different eras of construction over the base's lifetime.

The oldest and most historically significant buildings, from an architectural and engineering standpoint that form a coherent core, include the formal cluster of buildings dating from 1933 that lead up to, and include, the imposing Hangar #1 (the original dirigible hangar) and WWII Blimp Hangars. This area of the base is bounded by Bushnell Road on the north, the automobile parking spaces behind Sayre Avenue on the east, Westcoat Road on the south; and the entry, Clark Road, on the west. The central area is laid out in an axial plan in a northeasterly direction with the original buildings symmetrically placed along a grand central greensward. In addition to this very defined central space where the earliest major base buildings are located, there is an equally significant adjunct of 9 officers' residences clustered around Berry Drive just to the south of the main gated entrance in another formally laid out plan with grass medians, a grass island at the end of the southern cul-de-sac, and a characteristically suburban curved residential street. In keeping with the symmetry that was so strong to the original plan, another unbuilt residential complex was originally planned for the northern side of the entrance drive.

These earliest buildings, which were designed by the Navy Department Bureau of Yards and Docks, exemplify California's most popular contemporary architectural style of the 1920's and early '30's. They are constructed in a late Spanish Colonial Revival architectural style (a style that was equally as popular in government construction in the eastern sections of the United States during the 1920's and into the early 1940's), as well as aspects that presage the modern designs of the Internationalist styles which would predominate in American architecture for the next thirty-five years (from approximately 1940 to 1975).

8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties:

☒ nationally ☐ statewide ☐ locally

Applicable National Register Criteria ☒ A ☐ B ☒ C ☐ D

Criteria Considerations (Exceptions) ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G

Areas of Significance (enter categories from instructions)

Military

Engineering

Period of Significance

1930-1935

1942-1946

Significant Dates

Cultural Affiliation

Significant Person

Moffett, William Adger; Admiral

Architect/Builder

U.S. Navy Bureau of Yards and Docks

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

In the nation's quest to provide security for the lengthy expanse of it's coastlines the opportunity for air reconnaissance was realized by the futuristic Admiral William A. Moffett. Through his efforts, two Naval Air Stations were commissioned in the early 1930's to port the two U.S. Naval Airships (dirigibles) he believed capable of this challenge. The Naval Air Station Sunnyvale was the Pacific Coast location selected, designed and developed to port USS MACON (ZRS 5). The immense structure, Hangar #1, designed to house USS MACON, with its larger counterpart in Akron, Ohio, remain the two largest structures in the United States without internal support. At the onset of WWII, the base was expanded with Hangars #2 and #3 which were designed to accommodate the smaller blimps and balloons used for reconnaissance, until the range of heavier than air aircraft (airplanes) was sufficient to patrol the coast. The significance of the U.S. Naval Air Station Sunnyvale Historic District is attributed to the association with the expanding defense capabilities of the U.S. Navy, the engineering technology found in lighter than air ships, the design of the hangar and system for porting the dirigible and in the plan and architectural style of the station designed to support this defense technology. The significance of Hangar #1, was recognized when it was designated a Naval Historical Monument. It has been designated a California Historic Civil Engineering Landmark, by the San Francisco section, American Society of Civil Engineers, and has been determined eligible for listing in the National Register of Historic Places by the U.S. Navy in consultation with the California State Historic Preservation Officer. The entire historic district is supported for listing in the National Register of Historic Places at the national level of significance under Criterion A for the association with coastal defense and naval technology that has made a significant contribution to the broad patterns of our history; and Criterion C reflecting the distinctive type, period, method of construction and high artistic values that are represented in the 1933 station plan and buildings. In 1942, the station was recommissioned, U. S. Naval Air Station, Moffett Field, in recognition of the significant contribution to naval history by Admiral Moffett, contributions that have gained him the unofficial title, "Father of Naval Aviation."

9. Major Bibliographical References

Gragg, Dan The Guide to Military Installations, Harrisburg, PA; Stackpole Books, 1983
 Payne, Stephen M., Santa Clara County: Harvest of Change, Santa Clara, CA; Windsor Publications, 1987

Unpublished:

Histoirc Civil Engineering Landmarks of San Francisco and Northern California, 125th Annual Conference, American Society of Civil Engineers, San Francisco Section, Sponsor, 1977.

Ifft, Jerry. The Era of Dirigibles at Moffett Field, 1987; California Room, Martin Luther King, Jr. Memorial Library, San Jose, CA

Interviews:

Benjamin Mandweiler, NAS, Moffett Field, Public Works Department
 Lt. Col. Robert N. Maupin, USAF. Ret.

☐ See continuation sheet

Previous documentation on file (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested
☐ previously listed in the National Register
☐ previously determined eligible by the National Register
☐ designated a National Historic Landmark
☐ recorded by Historic American Buildings Survey # _____
☐ recorded by Historic American Engineering Record # _____

Primary location of additional data:

- ☐ State historic preservation office
☐ Other State agency
☒ Federal agency
☐ Local government
☐ University
☐ Other

Specify repository: _____

10. Geographical Data

Acreage of property 124 Acres (approximately)

UTM References

	Zone	Easting	Northing
A	1 0	3 7 7 0 3 6	1 2 2 0 5 9 8
C	1 0	3 7 6 9 9 9	1 2 2 0 6 2 5

	Zone	Easting	Northing
B	1 0	3 7 6 9 7 5	1 2 2 0 6 0 4
D	1 0	3 7 7 0 6 3	1 2 2 0 5 3 0

☒ See continuation sheet

Verbal Boundary Description

The Naval Air Station Sunnyvale includes all of the 1933 original base plan with the addition of the 22.5 acre detached area containing hangars #2 and #3. The boundary line begins at the Main Gate, including the entrance gate and fence, proceeds along Clark Road to Berry Road where the boundary turns south to encircle the quarters A through H, north behind quarter F to Westcoat Road, east to Sayre Ave., north to Bushnell Road and west to Clark Road. A detached area is included in the historic district to incorporate hangars #2 and #3 with a 25 foot band of land around the pair.

Boundary Justification

The boundary includes the limits of development in the 1933 base plan for the Naval Air Station Sunnyvale, as prepared by the Navy Department, Bureau of Yards and Docks, and the area incorporating hangars #2 and #3 that are associated with lighter than air military aircraft.

☐ See continuation sheet

11. Form Prepared By

name/title Bonnie Bamberg

organization Urban Programmers

street & number 1174 Lincoln Avenue

city or town San Jose

date November 9, 1991

telephone 408-971-1421

state California zip code 95125

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 7 Page 2

This hybrid style forms a unifying element that not only holds the myriad of architectural uses together, but gives the entire complex a very satisfying central theme. The style is highly ornamented in the most significant buildings (such as the Administration and Bachelor Officers' Quarters) and stripped of ornament, but no less supportive of the whole in the smaller out buildings and garages. Interestingly, the building that is the raison d'être of the entire Naval Air Station, Hangar #1, eschews any historicism in its design, but rather reflects the highest Streamline Moderne forms of modern technology at its finest.

Another slightly newer cluster of buildings is also defined by their distinctive architectural style which reflects the most popular designs of their time. These buildings are those structures which were built in the 1940's and early '50's and that are designed in a very plain International style of architecture defined by the simple stripped geometrical forms of the structures. These interesting examples are located at a few scattered sites within the original plat noted above (i.e. the Post Office, #67, for example), as well as being set in a long row along Dailey Road between the original campus plan and the Bayshore Freeway (#152). Other noteworthy buildings include the Control Tower (#158) at the far eastern edge of the site and the original Chapel Building (#86), which is a reinterpreted hybrid style that exhibits aspects of both a stripped Spanish Colonial Revival design and ornament hinting at more of a Mission Revival style. Additionally, two slightly smaller, but no less impressive hangars (Hangar #2 and #3), were constructed across the runways to the east of Hangar #1. These buildings were designed for the smaller blimps that replaced the huge rigid framed dirigibles of the 1930's for which Hangar #1 was designed. They also were designed in a much more prosaic and conventional architectural style than the metal sheathed futuristic Hangar #1.

A building that provides visual compatibility with the 1930's Spanish Colonial Revival buildings is the Chapel. This is due both to its physical location within the historic district, as well as to its architectural design, which is much more compatible with the older buildings on the base rather than the later International styled buildings. Early photos of the building illustrate a structure whose basic form of rather simply pitched cruciform plan appears to be very standard designed archetype military base chapel of the 1940's. But to this basic form, the designers add very site specific detailing which, though not technically a re-creation of the Spanish Colonial Revivals around it, very handsomely picks up hints of the building characteristics of the older structures. These details include, most importantly, the cupola which mimics the tower on the Administration Building, and the projecting curvilinear portico with its stone-like entry frame which takes directly from the Spanish Colonial Revival interpretations surrounding. The end result is an almost textbook example of a successfully designed new structure sensitive to an established architectural campus. Because the chapel was constructed well after the 1933 period it is not a contributing building to the historic district.

Because the International style buildings are less than 50 years old and are not individually exceptional, they will not qualify for listing in the National Register at this time and will not be discussed in any detail. This group consists of buildings 148-156, 158 and building 67.

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National Park ServiceNational Register of Historic Places
Continuation SheetSection number 7 Page 3

In addition to these two major stylistic groupings, there are a number of other buildings on the site that have been constructed over the past approximately 50 years that fill up the site, but do not represent very fine examples of architectural design. These buildings are characterized by their utilitarian function, such as the number of Quonset huts (#111, #118 and #119) found throughout the site, as well as the plethora of small wooden and stucco buildings with little discernible styling that comprise much of the barracks, enlisted housing, shopping and warehousing spaces (#E-52, #E-13, #E-29, #347, #223, #245, and #244).

Thus from a specific design standpoint, the site can be divided into the following five main components that comprise its strongest identifying features:

- A. Original Spanish Colonial Revival Design
- B. Significant Engineering Features (Hangars #1, #2, & #3)
- C. Miscellaneous Supportive Design Features
- D. Post 1935 buildings designed in the Spanish Colonial Revival Style
- E. International Style Buildings from the 40's

Out of these five categories, the proposed historic district from the 1930's will include all those features identified with item "A, B & C" immediately above.

**A. ARCHITECTURAL DESCRIPTION OF THE SPANISH COLONIAL
REVIVAL-DESIGNED ORIGINAL BASE BUILDINGS.**

The original plan of Moffett Field was constructed in an architectural style that had as its antecedent the exuberant and capricious ornamentation applied by the 17th Century architect, Jose Churriguere, and eloquently revived by Bertram Goodhue in the design for the 1915 San Diego Panama Pacific Exposition. The Navy first attempted the style at Chollas Heights Radio Transmission Station in 1916 and followed with Goodhues' Marine Corps Recruit Depot, c. 1920, Naval Air Station North Island, c.1921, and his sketches for the Naval Training Center in San Diego, a year or so later. This form of Spanish Colonial Revival design reached its zenith at the end of the 1920's and was gradually losing favor to the modern designs of the mid-to-late 1930's. By the 1940's only some very late examples, usually transitional in styling that reflected the rise of both modern schools of architecture (Moderne and Deco styles, as well as the later International or Bauhaus-influenced styles) were being built.

The complex of original buildings that comprise the heart of the Naval Air Station Moffett Field are examples of late Spanish Colonial Revival design reflecting a much more severe example of this style with strong influences of the more modern style precepts, as well as hints of Eastern Colonial designs. The resulting hybrid significantly alters the original architecture of this style.

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National Park Service

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These buildings are characterized as essentially two-storied white or off-white stucco structures that are capped by very low-pitched Spanish tile roofs, which are punctuated by projecting chimneys, air ducts and, in the case of the true centerpiece building, the Administrative Building (#17), a richly ornamented, roof pavilion where corner columns support a decorated dome. The buildings are all rectangular in plan with either central projecting spaces or corner wings. Wall surfaces are very plain with the major break up of space occurring either in the location of rectangular-shaped windows, slightly projecting stringcourses between the floors, round arched entryways or arcaded ornamentation styled to look like granite around the major entry doors and surrounding significant window spaces.

It is the variation of the above major design elements that define the original base architecture. The two most handsome entrances are the round arched arcades that distinguish both the aforementioned Administration Building and the equally impressive Bachelor Officers' Quarters (#20). Repeated ornamentation include the flattened urn motif, various cartouches, and quarter-foil windows found along the exterior surfaces of all the major structures. The juxtaposition between the flat surfaces of the exteriors contrasting with the florid ornament around the major doors and windows provide the perfect tension that distinguishes the Spanish Colonial Revival style. A notable somewhat stripped example of this style is the impressive original Aircraft Tower (#18).

Some of the minor out-buildings, although stripped of much ornamentation, exhibit sensitive design features such as the low stepped parapets of buildings #22 and #2, the repeated multilight apertures of #10, and the simple, yet distinctive massing of the original portions of #6, which acts to reinforce the common design theme throughout the historic core. All of these original outbuildings significantly reinforce the common design theme of the historic campus.

The second cluster of original buildings, which forms an equally impressive uniform design statement, is found in the earliest residential units of the detached officers housing. In this extremely pleasant space, made so by its luxuriant landscaping and large unbroken lawns, a very simple house plan is repeated with only slight variations. The structures are designed in a very stripped and somewhat severe Spanish Colonial Revival style with two-storied, rectangular plan residences joined to a garage, either a one or two storied garage, by an arcade. The roof lines are low pitched gables that are sheathed in red Spanish tiles and punctuated by end fireplaces. Apertures are symmetrically placed on the structures with the dominant design characteristically reserved for the front entry. Windows are generally rectangular in shape, double hung and 3 over 2 in design. As with the major buildings on the working base section, here two stringcourses and various door surrounds provide the major contrast to the very simple stucco walls. Additionally, a similarly designed structure forms a prominent security building at the front gateway.

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National Park Service

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Section number 7 Page 7

engineering construction; and for its very size that still dominates a greatly urbanized Santa Clara County in the 1990's. From all aspects of national landmark status criteria, this building qualifies on its own. When added within the context of the surrounding supporting campus plan, the entire ensemble forms a very unique sense of place within the built environment and continues to exhibit national prominence.

HANGAR #2 AND #3: BUILDINGS #46 AND #47

The site consists of twin hangars that were designed for the blimp fleet during WWII. They are of treated California redwood frame construction, configured on a rectangular plan in a more flattened parabolic form than Hangar #1; and characterized by their immense, moderately pitched porticoes at each of the north and south-facing hangar doors. These dominating entries are supported by very large concrete piers at each of the four corners. The twin buildings are set on a site plan that is directly oriented with the earlier Hangar #1, which is due west. The scale of the structure is exemplified by their dimensions, which at 1,075'x297'x171' (180,518 sq. ft.) make them slightly smaller than their predecessor, but still very impressive on the landscape. The use of wood construction instead of a steel truss system was in response to the war effort. Like most west coast military facilities constructed after 1941, metal was used very sparingly to conserve the resource for use in constructing ships and armament.

The design of these two buildings is in a much more conservative architectural style than the futuristic form of Hangar #1. These later hangars are almost domestic in their gabled porticoes. They definitely lack the daring and ingenuity of the other hangar's form and they are much less a unique design to the area. In fact, four other structures of like design were built on the west coast during World War II, to house the blimps used to patrol the Pacific coastal waters of the United States. Two in Coos Bay, Oregon which are no longer owned by the Federal Government and two on what is now Marine Corps Air Station, Tustin in Southern California. All four of these structures have been nominated to the National Register.

Although not of equal architectural or design merit as Hangar #1, these two like-structures are significant from both an historic perspective (as excellent extant examples of WWII blimp hangars) as well as an architectural/engineering perspective (they are after all buildings of incredible size and stature upon the landscape). The twin structures further add to the important design whole of the best of the original 1933 plan and the just slightly less impressive structures from the 1940's which help in-fill much of the site. They were completed in 1943. The combined visual power of Hangars #1, #2, and #3 form a physical presence upon the urban landscape which still dominates the low horizontal design of the Santa Clara Valley.

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National Park Service

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Section number 7 Page 8

ADMINISTRATION BUILDING: BUILDING # 17

The site consists of a two-story structure that is constructed on a shallow cruciform rectangular floor plan which is built of wood and sheathed in stucco with red Spanish tile roofing and terra cotta ornamentation, especially notable in the window and door surrounds. The building is the most prominently sited structure within the 1933 campus plan. It is set in the very heart of the open grassy median as a definite center point to the original plan. Its architectural design represents a late example of Spanish Colonial Revival style with some modifications that give it a kinship with Eastern military bases of the same vintage (that were designed in dry formal interpretations of Colonial Revival).

The building is 148'x41'x37' and contains 18,954 sq. ft. The structure is characterized by the features which define all of the original buildings: the very low pitched, slightly hipped and tiled roofline. Exterior walls are flat and devoid of ornament, save a stringcourse running the entire perimeter of the building and separating the two stories. The eave line is very shallow. Windows are simple, rectangular in plan, vertical in orientation, multi-paned and double hung. Overscaled terra cotta ornamentation define the major front and back entrances, as well as the centered second story window. The main or west-facing entrance projects out from the main structure and exhibits a triple round-arched, recessed entrance.

Ornamental urns, pilasters and floral design (characteristic of Churrigueresque Spanish architecture of the 17th Century) add a much needed ornamental counterpoint to the very simple and severe basic design.

A further feature which distinguishes this structure among all of the others in the original campus plan is the small centered Bell Tower. This small belvedere is capped by a diminutive, red-colored dome and distinguished by very flat arches at each of its four faces. This architectural style is much more characteristic of the colonial designs of the Eastern United States and is a major factor in classifying the overall base design as a modified Spanish Colonial Revival style.

With the nearby Bachelor Officers Quarters and the Married Officers' Residencies, the Administration Building, (which is also historically referred to as the Admirals Quarters) is the most architecturally important building from the original 1933 construction (excluding Hangar #1). This building sets the design criteria that is followed throughout the original campus plan. It acts both as a handsome example of hybrid revivalist architecture which is prominently set at the most important axial juncture of the site and as one of the most lavishly ornamented of Moffett Field's original structures. As such, the Administration Building is a key to the historic fabric of the site.

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National Park Service

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BACHELOR OFFICERS QUARTERS: BUILDING #20

The site consists of a large, two-storied structure that was constructed on an irregular rectangular shaped site plan which is actually symmetrical in form. The building exhibits a more ornamented interpretation of a hybrid Spanish Colonial Revival architectural design. It is characterized by the same basic features that distinguish all of the original buildings. The roofline is lowpitched and sheathed in red Spanish tile, the eave is fairly shallow, wall surfaces are unadorned white stucco; and window shapes are paired rectangular forms which are double hung, 3 over 2 in form. Major entrances are distinguished by terra cotta facing that emulates granite. Three large round arches provide the building with a very elegant entryway. Flat unadorned pilasters separate these arches. They are further adorned with flat urn detailing. The characteristic stringcourse separates the two floors. A rear wing projects toward the south.

The structure is sited symmetrically across from the equally prominent, but slightly less architecturally impressive, Bachelor Enlisted Quarters (#19) which has been greatly enlarged with a rather bland International Style addition at both ends. The structure is further enhanced by a well conceived and equally well maintained landscape plan.

Along with the cluster of major buildings that are set along the formal axis of North and South Akron Roads, the BOQ helps define the high quality design character that distinguishes the historic core of Moffett Field. The structure is an extremely fine example of historicist architecture of the 1930's and remains a key element in the cohesion of the base's physical form.

GYMNASIUM: BUILDING #2

The site consists of a very large, single-story, plaster-sheathed, steel framed building that is constructed on a slightly irregular rectangular floor plan with a flat roof that is distinguished by slightly projecting stepped parapets that hint at the utilitarian designs of the original campus plan of 1933. The roof is wood sheathing on steel beams. This structure exhibits a ubiquitous projecting stringcourse encircling the building, as well as the very plain beige plaster walls. The major design feature on this essentially utilitarian structure is in the window placement. Here, the structure is characterized by very tall, horizontally-banded, multi-paned apertures which act to break up the surface of the exterior walls either as centered indentations on large expansions of plaster or as repeated forms which act almost like columns along the major side elevations.

This structure avoids, as do all of the original functional outbuildings, the Spanish Colonial Revival design of the major living areas of the base. Interestingly, it provides a handsome architectural bridge between the very futuristic Streamline Moderne design of Hangar #1 and the more historicist styles of the original campus plan.

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The site is significant both historically and architecturally. It was originally constructed to be a balloon hangar which justifies its extremely large interior single story space (19,691 sq. ft., 130'x88'x63'). Additionally, the building sets the reserved design criteria for the outbuildings on the base which handsomely support their more ornamental Spanish Colonial Revival contemporaries. Features which characterize these original outbuildings include flat roofs, shallow parapets which are slightly stepped; and severely unadorned exterior walls. Windows are rectangular in form and provide the dominant design ornamentation.

Although these buildings do not provide the obvious ornamentation, stylistic historicism or landscaped surroundings of the more apparently significant original Spanish Colonial Revival structures, they exemplify an extremely sophisticated design criteria of their own which greatly adds to the overall cohesion of the existing campus. In their own right, the Gymnasium, along with similarly designed original 1933 outbuildings such as the Garage (buildings #21 and #22), are major factors from the original 1933 design which make NAS Moffett Field so architecturally distinguished.

BUILDING #23, INSTRUCTION BUILDING

Fronting on Akron Road, the former dispensary is one of the buildings that defines the original architectural design and is symmetrically placed, opposite building #25, to balance the entrance to the base's formal plan. The two story, above grade, building is basically a "T" form executed with the typical elements of the Spanish Colonial Revival architecture, low pitched tile roof, stucco sheathing and terra-cotta ornamentation. The front facade has a central entrance recessed behind three arched openings that form an arcade. Terra-cotta surrounds decorate the three windows above the entry and the doors at the east and west ends. The building, originally the base dispensary, was enlarged by the U.S. Army's Air Corps in 1936, when extensions were added to the rear and the east end. The building is 105 feet by 96 feet and 10,995 square feet of floor space.

Of the original buildings, #23 and #25 are significant because of their representation of the Spanish Colonial Revival design and for their locations at the entrance of the working station. Opposite each other, across the central lawn mall, these buildings provide symmetry to the original plan.

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BUILDING #25 THEATER

The theater, two stories over a basement, is a typical example of the significant supporting buildings that define the original architecture. The "T" form is executed with a low pitched tile roof, stucco sheathing and terra-cotta ornamentation. The typical protected entry is behind an arcade that, in this case, is projected forward. The fenestration, again typical of the dominant style, is symmetrical for all floors except those voids above the entrance. Here the pattern changes to a band of windows divided into three elements that balance the three arches of the arcade. The building is 150 feet by 110 feet in an irregular plan that accommodates 7,745 square feet of floor space.

BUILDINGS #21, #22 AND #24 - GARAGES

This group of detached garages are supportive elements in the historic district. Each is one story and is constructed using typical materials and simple forms of the ancillary buildings. Buildings #21 and #22 retain the original use and design, including corner parapets. The buildings, located behind Building #20, are almost identical, 98 feet by 24 feet with garage door openings facing each other. Building #24, located behind Building #23, was the ambulance garage. It is smaller 45 feet by 30 feet. The large garage door openings have been infilled and the interior space modified for administrative offices.

The garages are significant supportive buildings that compliment the architecture of the larger buildings. Building #24 retains the original mass and form but, the alterations have changed its appearance as a garage.

BUILDING #10 - HEAT PLANT

One of the original buildings, the heat plant is a large industrial building of block massing in an irregular "T" form that is two stories in height. A single story element fits into the south west corner. Typical of power plant design, the dominate feature is the fenestration. This building has window banks that extend to the second story. A coursing separates the massing with smaller rectangular windows above the band. In keeping with the dominant architecture, this utilitarian building is decorated with a simple surrounds at the entrances. Flat arches top the tall window banks. The glazing is rectangular pane divided mullions. Most of the first floor windows have transoms that are operable. While the upper rows are all operable. A second coursing divides the lower portion of walls at about four feet, the basement line. Building #10, is sheathed in stucco with a flat roof. This building is a handsome version of a utilitarian industrial design.

The heat plant is one of the original buildings. It is significant as an example of the dominate architectural design stripped to the essence, entrance surrounds and arched windows, for industrial use.

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STRUCTURE #5 - Water Tower:

Supported by a tall steel frame, the water tank is topped with a conical roof. The traditional red and white checkered paint defines this classic industrial design. One of the original structures, the water tower is a functional and visually distinctive feature.

BUILDINGS A THROUGH I AND ANCILLARY GARAGES A-1 THROUGH I-1

REPRESENTATIVE SINGLE FAMILY RESIDENCES (COMMANDING, SENIOR AND JUNIOR MARRIED OFFICERS QUARTERS):

The original 1933 detached residential structures are all designed in a like architectural style of which any single building represents an archetype for the whole. The example used here is site #A1, which is referred to in the 1933 landscape plan as the "Commanding Officers' Quarters".

The site consists of a very simple, two-storied, rectangular-planned single family residence that is constructed of wood frame with a low gabled red Spanish tiled roof over a very plain stuccoed exterior (which is punctuated by a formal placement of both windows and doors). A simple chimney adorns the western facade. An attached single-storied, round-arched breezeway connects the residence with a large, two-storied, rectangular-planned garage set slightly behind the main structure.

Stylistically, the residence reflects all of the specific design criteria which unifies all of the original 1933 Spanish Colonial Revival architecture on the base. Windows are almost flush with the plain exterior walls. They are also essentially rectangular in shape, double hung, multi-paned and symmetrically placed along the facades. A colored, projecting stringcourse separates the two stories. The front entry is the most prominent exterior feature with a slightly recessed almost flat arched entry with projecting surrounds. An ornamental sidelight window is balanced by a large wrought iron projecting lamp on both sides of the main entrance.

Landscaping is characteristically both formal and very well maintained. The very large mature trees add immeasurably in setting apart the residential quarter as an oasis amid the functioning base. The open greenswards that distinguish the street directly tie in with the more formal axial plan of the rest of the base. The curved street pattern illustrates the influence of contemporary suburban design on such residential planning even on a military base.

The original 1933 detached residences form a key architectural component in the significant whole that distinguishes the site plan of the naval air station. Along with the verdant landscaping and extra wide spacing, this enclave of buildings helps define all that is special about the site from a design perspective.

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CONTROL TOWER: (AEROLOGICAL BUILDING FLIGHT CONTROL TOWER) BUILDING #18

The site consists of a moderately-sized (3590 sq. ft.), two-storied building with a centered third story, hexagonal-shaped Control Tower. The structure is designed on a slightly varied rectangular floor plan with a very minimal attempt at exterior ornamentation. It is another of the utilitarian structures from the original plan that exhibits hints of the Spanish Colonial Revival design of the major buildings (in the centered round arch, the overscaled twin wrought iron Spanish styled lamps on both sides of the entry and the ubiquitous terra cotta surrounds ornamenting the front door). Otherwise, this structure is very simple in its design. Its walls are unadorned plaster. Windows are slightly recessed, rectangular in plan, multi-paned, double hung and symmetrically placed along the exterior facade.

The hexagonal tower is, along with the projecting metal tower above, the most distinguishing feature of the structure. It is characterized by its band of vertically oriented windows on each of the eight faces, as well as the iron railing which caps the flat-roofed tower from above.

The building's significance is due both to its history as the original Control Tower for the air station, as well as to its architectural design which once again exemplifies the sophisticated aspects of the original 1933 plan. The structure provides a transition between the more historically refined Spanish Colonial Revival architecture and the simple, yet equally impressive, more modern styles of the utilitarian outbuildings. It is the cohesion provided by the interaction between these two styles that provide the stylistic excellence of the historic core plan.

TWIN SMALL TOWERS (FLOOR WATCHTOWERS): BUILDINGS #32 AND #33

These two twin sites (#32 and #33) consist of very small, two-storied towers that are distinguished by their very unusual design. They are towers that are distinguished by their very unusual design. They are very small structures (578 sq. ft., 14'x14'x25') that appear to be composed of a standard two-story rectangular tower with flat roof joined to a slightly smaller two-storied rounded tower with like flat roof that is capped with metal railing. The buildings are very simple in form. There are really no specific architectural embellishments. They exhibit all of the standard features of the utilitarian structures on the base without any ornament. Recessed, double-hung, multi-paned windows provide the major characteristic design feature which ties them into the surrounding historic core buildings. A prominent projecting stringcourse characteristically separates the two floors.

The significance of these two small utilitarian buildings is primarily in their unique function and form. They are very site specific and add a distinctive counterpoint to all of the rectangular shaped structures on the base. They are architectural curiosities that add immeasurably to the historic and architectural importance of the site.

Form 10-900-6

OMB APPROVAL NO. 1024-0078

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INTERIOR SPACES:

Naval Air Station Moffett Field has been in continuous use since it was constructed. During the years the interiors of the buildings were altered to accommodate changes in uses and space requirements. The alterations have redesigned the original interior space plans; removed the original surfaces and changed the spacial feeling of the interiors. Due to the alterations, the interiors do not retain architectural integrity or historic significance.

NON-CONTRIBUTING BUILDINGS

Within the boundary of the historic district the number of non-contributing buildings exceeds the number of significant buildings and structures. This unusual ratio does not diminish the significance or integrity of the district. Most of the non-contributing buildings were constructed after the period of significance and are primarily small utilitarian constructions. The Chapel and heating plant, buildings 86 & 87 were constructed after the period of significance yet are designed in the idiom of the district. Thus, Naval Air Station Moffett Field, despite the imbalance in numbers of contributing and non-contributing buildings, maintains exceptional integrity of the 1933 station plan and architectural design.

The International style buildings were predominately constructed after 1944 and are not 50 years old. Therefore, they are not eligible for listing at this time. The Post Office, building #67, constructed in 1943, one of the finest examples of this style, is not significant as an individual building and should be included with the later International style buildings.

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SIGNIFICANT AND CONTRIBUTING BUILDINGS

BLDG. #	CURRENT USE	ORIGINAL USE
1	Hangar #1	Hangar #1
2	Gymnasium	Balloon Hangar
5	Water Tank	Water Tank
10	Heat Plant Building	Storehouse
15	PW Shop	Fire Station/Laundry/Garage
16	PW Shop	Locomotive Crane Shed
17	CPWP Administration	Administrative Building
18	NAV RES Administration	Aereological Center
19	BEQ	BEQ/Brig
20	BOQ	BOQ/Mess Hall & Galley
21	BOQ Detached Garage	BOQ Detached Garage
22	BOQ Detached Garage	BOQ Detached Garage
23	Instruction Building	Dispensary E
24	Administrative Office Building	Ambulance Garage
25	Base Theater/Recreation Service/Thrift Shop	Bowling Alley/Recreation Building
26	Gate House/Iron Fence	Gate House/Iron Fence
32	Storage	Tank House
33	Storage	Water Tower
37	Scale House	Scale House
A, A1	Officers Housing and Garages	Housing and Garages
B, B1		
C, C1		
D, D1		
E, E1		
F, F1		
G, G1		
H, H1		
I, I1		
46	Hangar #2	Hangar #2
47	Hangar #3	Hangar #3
55	Heat Plant for Hangars #2 and 3	Heat Plant for Hangars #2 and #3

SIGNIFICANT OBJECTS

40	Flagstaff/Commons Memorial Anchor	Flagstaff and Commons Anchor
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NON-CONTRIBUTING BUILDINGS

1930-1933 - Altered (loss of architectural integrity): Buildings # 3, #6, #12, #13, #14,
#29, #31, #36, #501.

1940-1944 - Altered (loss of architectural integrity): Buildings #240, #241, #242, #514,
#515, #516, #517

Assembly Buildings: #45, #85, #115

Quonsets: #81, #117

Sheds: #34, #44, #83, #347

1940 - 1944 (outside period of Significance) Buildings: #67, #64, #86, #87,

All buildings and structures constructed after 1944, including: #76, #77, #123.

All ancillary buildings and structures, in proximity to Hangars #2 and #3, that are very small, altered or constructed after 1944; #79, #98, #186, #346, #350, #367, #368, #396, #440, #470, #472, #499, #539, #540.

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Several factors contributed to the commissioning of the U.S. Naval Air Station Sunnyvale on April 8, 1933. Of foremost importance was the vision for the future of aircraft and influence of Admiral William A. Moffett. Appointed by President Harding on July 25, 1924, to be the first as Chief of the Naval Bureau of Aeronautics, Admiral Moffett had already established himself the proponent for increased Naval aircraft as an integral component of the Navy's ability to control the seas off the coasts of the United States. In the 12 years that Admiral Moffett lead the bureau, the U.S. Navy was catapulted into the lasting interlocking strategy of Naval presence in the air as well as the sea. But he also spoke of the future in commercial aviation. In the 1920's, he appears fascinated with the lighter than air technology of the dirigibles. The success of the zeppelins in WWI contributed to the development of the larger dirigibles. This was however, marred by the disasters resulting from the flammability of the hydrogen used to fill the chambers. Each country involved in the hydrogen filled dirigibles experienced tragedy. A memorial plaque in Shenandoah Plaza at Moffett Field commemorates USS SHENANDOAH that was lost with a crew of 14 on September 3, 1925. The largest of the dirigibles, HINDENBERG, burst into flames over Lakehurst, New Jersey in 1937, culminating a series of tragic losses involving the dirigibles and hydrogen. Helium, produced only in Texas and Kansas, had been known to be a reasonable replacement for hydrogen, but was prevented from export by the 1925 Helium Export Act. Moffett began a lobbying campaign to have the U.S. Navy use helium filled dirigibles to patrol the coasts. In Moffett's plan, these giant rigid frame airships would provide the long range observation for the surface Navy below. He believed the dirigibles could be fashioned to carry small planes and might even be equipped with bombs. The idea was not far-fetched. The technology of the 1920's allowed dirigibles which could stay aloft for 14 days and fly 10,000 miles. The lobbying proved successful with the 1926 congressional authorization for two Naval dirigibles capable of carrying aircraft and a new aircraft base for the west coast. The dirigibles were to be built by the Goodyear-Zeppelin Corporation in Akron, Ohio. The first to be completed was based at Lakehurst, New Jersey. The selection of the site and construction of a base to service the second would be undertaken on the west coast.

The west coast site appeared to be slated for Camp Kerney near San Diego when the northern California politicians realized the opportunities to be created and forced the federal planners to accept applications from the entire west coast. Applications were received from 997 locations. San Francisco mayor, James Rolph, saw the benefit to the Bay Area even though his city did not have a site suitable for the base. The appeal was for 2,000 acres with unobstructed approaches, clean water, rail access and good flying weather was heard by Mrs. Laura Whipple, a recently established real estate broker from the East Bay. Familiar with the Sunnyvale area, she selected the Rancho Unigo, a former Indian Reservation, that seemed to meet all the criteria. Appointing herself "Chairman of the Landholders Commission", she obtained an option for 1,750 acres at the price of nearly \$500,000. She wired San Jose congressman, Joseph Free, that a perfect site for the dirigible base had been located and optioned. The proposal from San Diego offered free land; in order for the Sunnyvale site to be selected the same offer would have to be made. Under

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the leadership of presidents of the Chambers of Commerce from Mt. View and San Jose, a campaign to raise the funds and solidify the offer went forward. The newspapers, including the San Jose Mercury Herald, were enthusiastically in support of the proposal and offered publicity and public relations material to support the proposal. After three years of study and debate, it was time for a decision. On December 28, 1930, the vote registered by the House Naval Affairs Committee for H.R. 6810, introduced by Congressman Free, selected Sunnyvale by 18 to 1 and Camp Kerney as the auxiliary base. As a member of the West Coast Naval Airship Base Board, Moffett had favored Sunnyvale while the Secretary of the Navy, Charles F. Adams, preferred Camp Kerney.

Once selected, the issue remained to raise the money to purchase the land. Under the leadership of A. M. Mortensen, President of the San Jose Chamber of Commerce, the funds were raised and on August 2, 1931, the Chamber's check for \$476,165.90 completed the purchase of 1000 acres of the Rancho Unigo. Also on August 2, 1931, the land was transferred to the U.S. Navy for \$1.00. This completed a long and arduous partnership between the cities of the Bay Area to gain the prestige, jobs and economic interests that would follow the base.

The budget for constructing the base was \$5,000,000. The U.S. Navy of Yards and Docks would be responsible for the design and coordinate the construction. Lt. Commander Earl Marshall was given the responsibility. Ernest Wolf, an experienced engineer from the Goodrich Zeppelin Corporation, was to be the Associate Engineer. Hangar #1, as it would be called, was the most important building and received the first attention. The design had been refined in Akron by Dr. Hugo Ekener, to form a rounded building that followed the form of the dirigible. Enormous curved doors on each end would slide over the building, rolling on 40 wheels over standard gauge railroad track, and propelled by 150 hp electric motors, thus minimizing the turbulence and problems encountered with past designs. In fact, it was the window patterns that dictated the north-south orientation and siting of Hangar #1; the rest of the base followed. Of the \$2,250,000 budgeted for the hangar, \$1,116,044 was awarded to the Wallace Bridge and Structural Steel Company of Seattle to fabricate the steel for the structure and doors. Seims-Heimers, Inc. of San Francisco bid \$398,937 for the roofing, windows and siding on the airdock that would measure 1,133 feet long, 308 feet wide and 198 feet high. The floor area is just over eight acres. A structural space frame, the design and construction of this hangar remain a feat unparalleled in the engineering of enclosed space.

Railroad tracks ran through the hangar, culminating at the mooring tower. The tower secured the dirigible to the ground by mooring lines. This tower has been removed. The other large structure that was necessary for the dirigible was the helium tank that was located in front of the hangar.

The plan for the base and the design of the buildings was also undertaken by the Naval Bureau of Yards and Docks.

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The style for the buildings, Spanish Colonial Revival, is reflective of the popularity of the revival movement and the desire of the local politicians to have the base designed in the "California Style" of white stucco walled buildings with red tile roofs. The plan and building design was very formal, an axial orientation with the hangar to the east and the base extending west. Following the Spanish influence, a large plaza is the central element with the most ornately decorated building, the Administration Building, at the head of the plaza behind the flag pole and in front of the hangar. On the south side of the plaza were located the dispensary and Bachelor Officers' Quarters. To the north were the recreation building and the barracks. To the southwest on the cul-de-sac were located the nine officers' houses and garages. Extending to the east, and south, behind this formal plaza arrangement were the utilitarian buildings, fire station, garage, laundry boiler plant, locomotive and crane shed, shops, helium storage and water tower. To the north were the commissary, store house, gas station, balloon shed and storage buildings. Directly behind the Administration Building was the cafe (later the Officers' Club), and of course, the Hangar. The base was designed in anticipation of the importance of the automobile. Broad roads, large parking areas and garages were incorporated in the plan.

Landscaping was carefully planned to mature in harmony with the buildings and circulation elements. The area considered the Naval Air Station Sunnyvale Historic District maintain the integrity of the original design and represent one of the finest formal plans for a government facility in California. It was a forward-thinking plan with expansion to occur outside the formal plaza, thus the quality of design has been maintained. The original base is a one-of-a-kind facility in the Santa Clara Valley with great importance in the architectural heritage, facility planning and economic growth of the region.

The primary significance of the historic district is the association with the "lighter than air" dirigible program. The dirigibles, to be the eyes in the sky for the Navy, were in operation for a relatively short time. USS MACON, one of the two dirigibles constructed for the Navy, was christened by Mrs. William Adger Moffett (wife of Admiral Moffett) on March 11, 1933. An article about the landing in Sunnyvale was reported in the October 15, 1933 edition of the San Francisco Chronicle that read, "30,000 Thrilled as the MACON Moors at Home Station." The sister dirigible, AKRON, had been lost on April 13, 1933, making the MACON the last dirigible. For 16 months, USS MACON was a common sight over the Santa Clara Valley as it performed in a number of military maneuvers with the Pacific Fleet. Admiral Moffett had been well aware that the slow moving dirigibles could be of great benefit when assigned as an observatory for the fleet, but were vulnerable if used in maneuvers with the fleet. Shortly after arriving at Sunnyvale, USS MACON was deployed on tactical maneuvers with the Pacific Fleet. Equipped with an internal hangar and steel frame hoist termed a "trapeze", USS MACON carried four small fighter planes. The Sparrowhawks (F9C) were bi-plane fighters developed specifically to be carried in the dirigible by Curtis. Each weighed only 2,500 pounds with a pilot. As an airborne carrier, the dirigible was a hulking target that "failed to demonstrate military usefulness," according to the Commander in Chief of the United States Fleet, Admiral David Sellers. While returning from maneuvers with the fleet on February 12, 1935, USS MACON experienced a structural failure and crashed into the Pacific. Of the 83 crew, only 2 were lost. It was the headline in the San Francisco Chronicle the next day that told the story, "Dirigible Doomed as Defense Factor, Officials Say." The era of dirigibles was over, the only remaining element of the Moffett five year plan was Hangar #1 and the base at Sunnyvale.

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During this period, the U.S. Army Air Corps operated a limited number of blimps in conjunction with observation exercises. In September, 1935, seven months after USS MACON went down, the Army assumed control of the base and Hangar #1. The facility was used by the Army for pursuit and observation activities until 1940 when it was converted to the West Coast Air Corps Training Facility. During this period, the dispensary was enlarged and barracks were added.

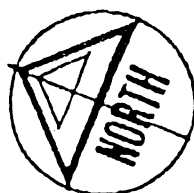
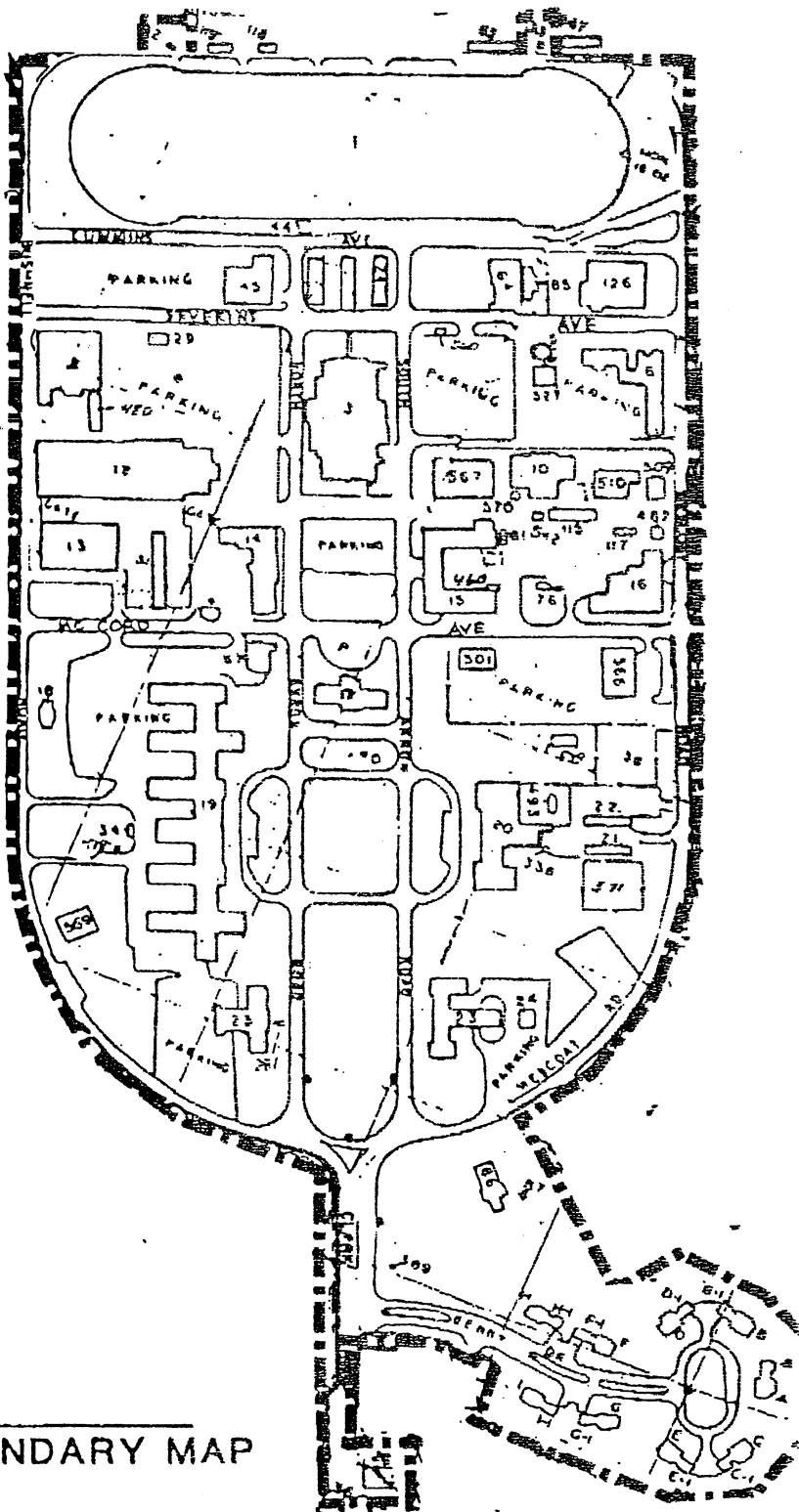
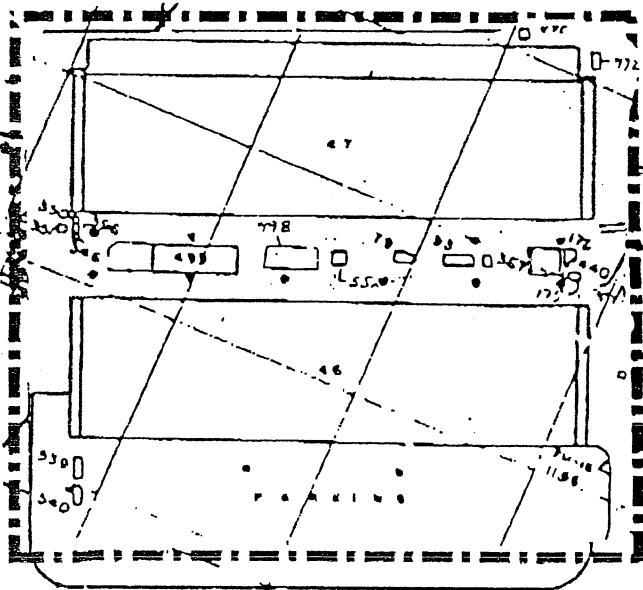
Shortly after the outbreak of WWII, the base was returned to the U.S. Navy. In April, 1942, the base was recommissioned Naval Air Station Moffett Field.

The return to Naval Command was to provide expanded facilities for small blimps and balloons used for coastal observation. Hangars #2 and #3 were constructed for blimps in 1942. They are included in the historic district because of the use as a lighter than air facility, and for their architectural/engineering importance.

One of the most recognizable landmarks in the San Francisco Bay Area, Hangar #1 and the original base are significant in the history of Naval Aviation, defense and in the development of the Santa Clara Valley. From the original base and because of the facility location and landing field, NASA Ames Research Center is located to the north adjacent to the original plaza boundary and at the north boundary of the historic district. It is far easier to measure the importance of the dirigible in Naval Aviation and defense history than it is to measure the enormous impact upon the growth of the defense and space industry in Northern California because of the original location of this base with the 1000+ acres.

The Naval Air Station Sunnyvale Historic District is recommended for listing in the National Register of Historic Places at the National Level of significance under Criteria A, as the only base designed specifically for the Navy to home port USS MACON, the only dirigible in the fleet, a significant contribution to the broad pattern of our history; and under Criteria C, a facility plan and architectural design that embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

The landscape plan (Y&D drawing No. 115840) was approved on April 29, 1933. This plan shows the base in its entirety.



DISTRICT BOUNDARY MAP

Form 10-500-4

OMB Approval No. 1024-0016

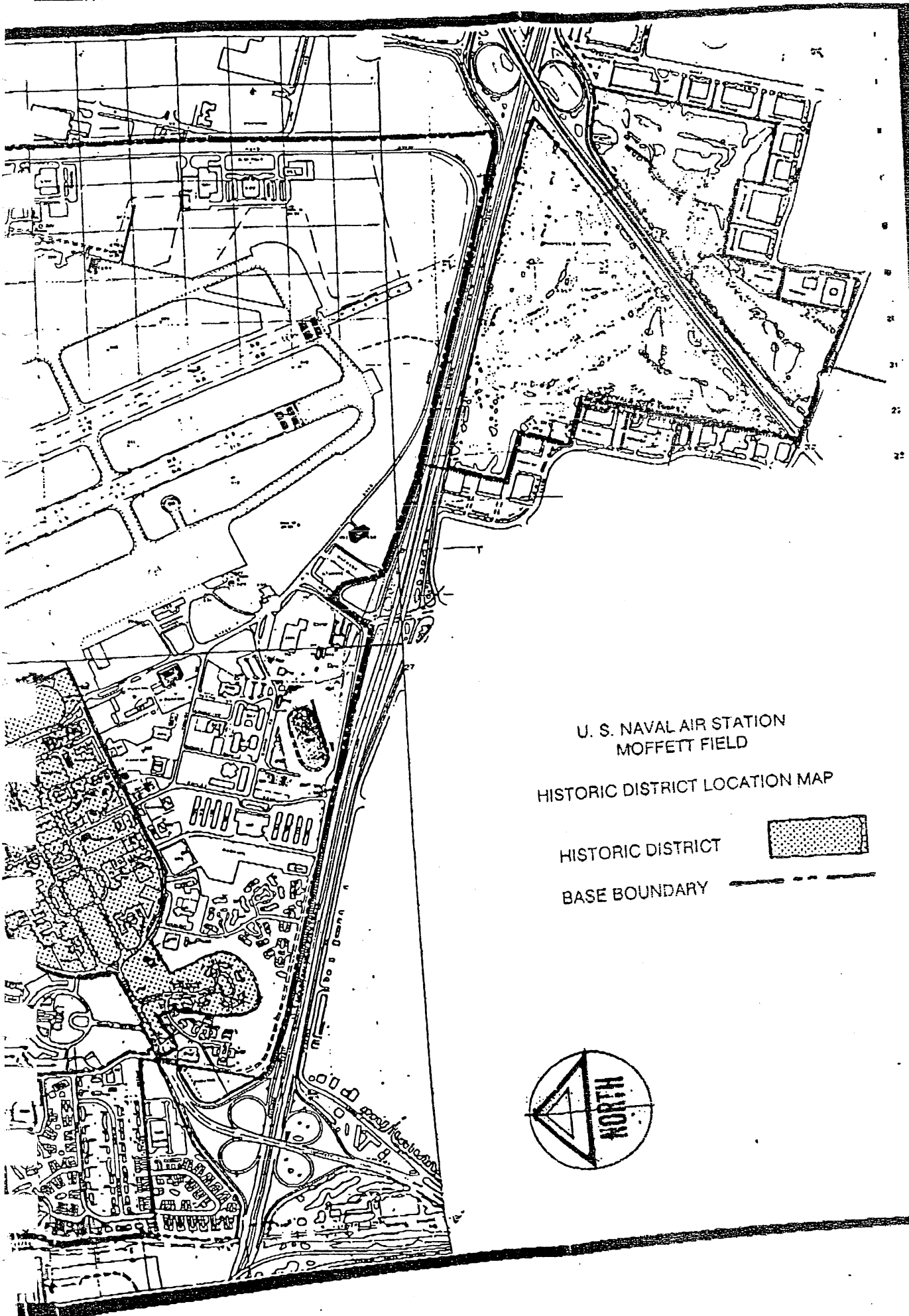
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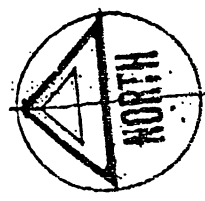
ZONE 10

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B1	37.7060	122.0421
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D1	37.7105	122.0408



U. S. NAVAL AIR STATION
MOFFETT FIELD
HISTORIC DISTRICT LOCATION MAP

HISTORIC DISTRICT
BASE BOUNDARY



Navy Department-Bureau of Yards and Docks
Landscape Plan April 29, 1933
U.S. Naval Air Station
Sunnyvale, California

